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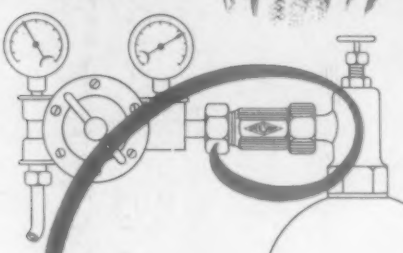

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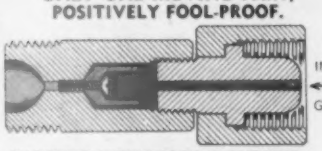

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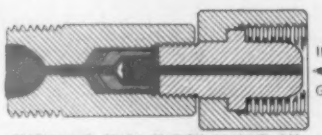

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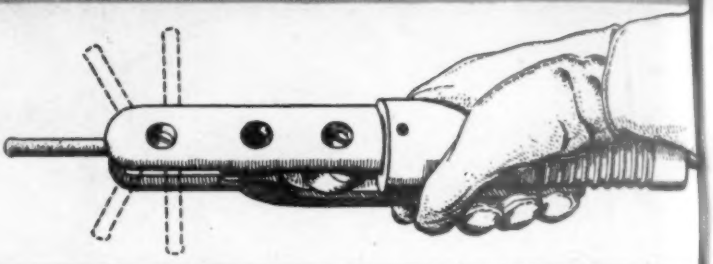

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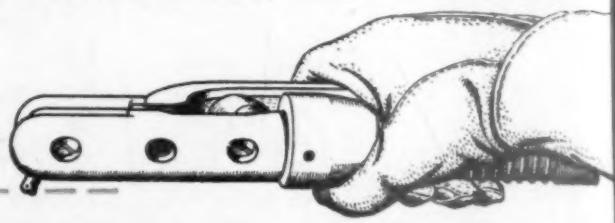

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THE WELDING ENGINEER

THE WELDING ENGINEER, with which is consolidated The Acetylene Journal

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Fig. 1—Assembly trailer frames. Note the size of the I-beam sides

All-Welded Truck Trailers

BY FRED M. BURT

One production operation—arc welding—stands out above all others in the manufacture of truck trailers in the plant of the Fruehauf Trailer Co., Los Angeles

WHETHER IT BE a van, a stake-and-rack unit, a gasoline, oil or propane gas tank trailer or a huge carry-all that will transport a load of 125 tons on its 32 wheels, every truck trailer manufactured in the Los Angeles plant of the Fruehauf Trailer Co. is specially engineered to meet its specific needs. This fact is the basis of the Fruehauf slogan, "Engineered Transportation," which might very well be supplemented with the phrase, "Welded Transportation." For both welding and flame-cutting are used extensively throughout the Fruehauf plant, resulting in trailer constructions that combine the maximum of strength with the minimum of weight.

The truck trailers take form on continuous production lines. As there are times when nearly every trailer on the line differs from the others, the production system is necessarily very flexible.

Fig. 4—View of west end of van production line. The large number of shape-cutting machines shown here were used in wartime to cut plates for M-5 tanks. The plates were carried to successive operations on four-wheeled trucks pulled by chain conveyor. The chain is now used to move vans along the production line

This flexibility is obtained only by providing ample square feet of floor area and height for every operation and storage as well as ample service by the proper overhead handling equipment and utility power trucks.

The main building is 800 ft long with a clear span of 121 ft. Adjoining it on the south side is a new storeroom building, 60 by 750 ft, from which materials, parts and other supplies are fed (1) to the manufacturing department (located between the stores and the production lines) and (2) to the racks of storage compartments between the center aisles and the chassis line. A trailer is not started in production until all its parts are available.

Trailer frame construction starts in the southeast corner of the plant just to the left of the door through which the finished trailer is delivered. The first operation involves the placing of heavy side rails in position on steel horses. Cross members are then welded in place (Fig. 2), using one of several portable arc welders in this department. These cross members are wide, flanged and extend the full width of the trailer; their ends are welded to the side rails. Most of the frame fabrication is done by welding with the use of some rivets.

In all, there are 41 welding machines in the plant. Six are a-c units and the rest d-c. Gas welding is also used for special purposes.

The positioning and subsequent welding of frames follow very close measurement specifications. Even so, frames 35 feet long are not unusual. Clamps used for the alignment of such frames are supplied from convenient portable racks.

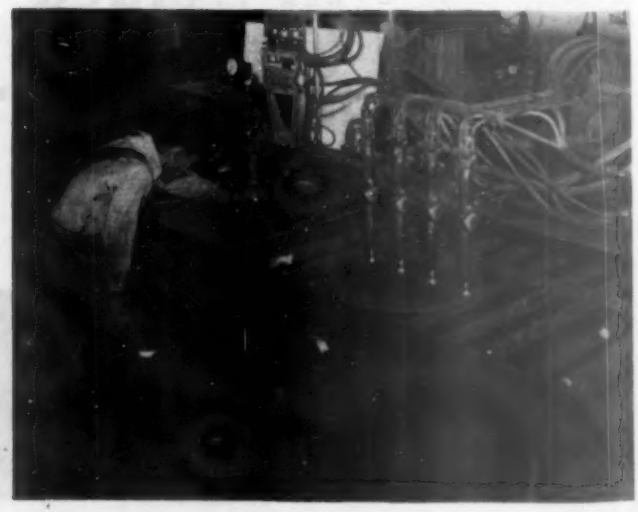
Production Sequence

The completed frames, mounted on three-wheeled trailers, are moved across the aisle to start the chassis assembly line. Several tramrails carrying 1½-ton electric hoists are centered over the full length of the assembly line to facilitate the handling of various chassis parts. Two parallel tramrails, 20 ft apart and about 14 ft from the floor, extend over the jigs and to the end of the line. Several transverse tramrail units operating between the rails carry electric hoists for transverse movements over the assembly line.

The first step in the assembly is to weld the outriggers to the frame. There are floor supports extending outwardly from the side rails. As the frame moves ahead on the assembly

Fig. 2—Van floor supports showing the ends of the flanged cross members being welded to the side rails

Fig. 3—Flame-cutting special parts with a multiple-torch machine. The operator traces the pattern manually



line from the outrigger's station, it approaches another assembly line which has its origin on the opposite side of the shop. This is the axle assembly line which starts in the axle department where the axle, brakes and hubs are joined as a unit. As this assembly moves forward, the springs are attached, and when the two assembly lines meet, the axle-spring unit is mounted on the frame. To take care of any variations that might come up in the way of forging, welding and cutting, there is a forge or blacksmith shop located in the general vicinity.

Final Assembly Stations

Next on the assembly is the hydraulic system for the brakes. Piping is installed between the steel tanks previously welded in the frame and the brakes. After this station comes the electrical assembly, where all wiring for the chassis is installed. The chassis then moves forward to receive its permanent serial number and a final inspection. The inspector carries a complete set of specifications so that he may check each job to determine whether or not it is complete and complies with the special requirements indicated on the order.

On down the aisle from the axle department is the tire storage room, followed by a large wood-working shop and a sheet-metal shop. The huge shears and press brakes in the latter shop are used to shear and form sheet steel for bodies and to shear light steel floor plates. All of the heavier plates are flame-cut with oxy-acetylene torches or with motor-driven shape-cutting machines (Figs. 3 and 4). Beyond the sheet-metal department is a large area where stack and rack body are mounted on the chassis.

"Aerovan" Construction

Those chassis to be fitted with van bodies are placed after inspection in a returning line, close to the north wall. Midway in this line is a large area containing the positioning jigs on which the side, top and front frames of the van trailer bodies are fabricated by welding light steel tubing. The cutaway picture (Fig. 5) of the Fruehauf "Aerovan" shows the great number of points of jointure of the framework members. All of these are arc welded.

Just before the chassis is moved over to the finish line, traveling toward the paint booths in the east end of the plant, the ten longitudinal high-tensile-steel floor ribs are clamped and welded in place on the cross members (1 of Fig. 5). Each side of the rib is welded to each cross member. The oak flooring rests on the flanges of the longitudinal ribs and is of the same height, making a flush-top flooring when installed. With this type of support on the strong but lightweight welded construction, the floor has a load-carrying capacity of 1,000 psf.

The top longitudinal members have an innovation taken from aircraft manufacture; i. e., lightening holes. These flame-cut lightening holes (see 3 of Fig. 5) reduce the weight of the member without materially decreasing its strength.

Tramrails are also used to pick up the welded sides, tops and bottoms and to carry them to the mating jig at the start of the line. They then are welded together. The mating jig for the frame is of standard 93½-in. width and 35 ft long. The whole framework is then picked up, carried a little further and placed on the chassis, to which it is welded.

At this point the partly completed vans are attached to a conveyor chain to be pulled along the assembly line from station to station with intermittent but regular movement. Platforms with different, convenient work levels are suspended from the tramrails at each side of the line and travel along with the van trailers, carrying workmen, tools and parts for work to be done on the outside, such as attaching the sheet-steel side panels. These platforms are also used when the mating jig is in use for welding of the side, tops and bottoms to each other and to the side rails.

Carry-all type trailers are built in a location to the rear of the main building in which the truck trailers are assembled on production lines. The carry-alls are fabricated, a job of about 99% welding, after the parts have been flame-cut to size. Short production lines running crosswise of the high, open rear building, are served by a heavy crane.

An unusual heavy-duty job was the construction of three ore-truck trailers

Fig. 5—Cutaway view of an "Aerovan" trailer. The entire framework is put together by arc welding. (1) Frame cross members die-formed of high-tensile steel; (2) steel rub-rail to protect body sides; (3) high-tensile steel top member with lightening holes; (4) roof members die-formed into channels; (5) vertical supports; (6) rectangular steel tubular struts; (7) sheet-metal top with coin-pressed seams to make one solid sheet of metal

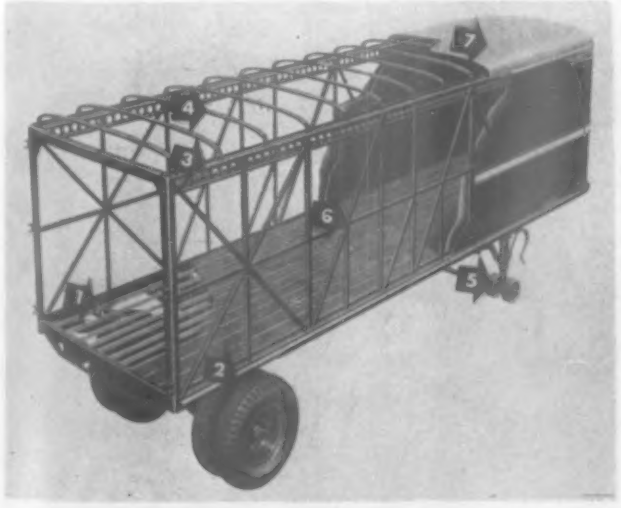


Fig. 6—Ore truck trailer frame in an upside-down position for welding longitudinal beams to cross members

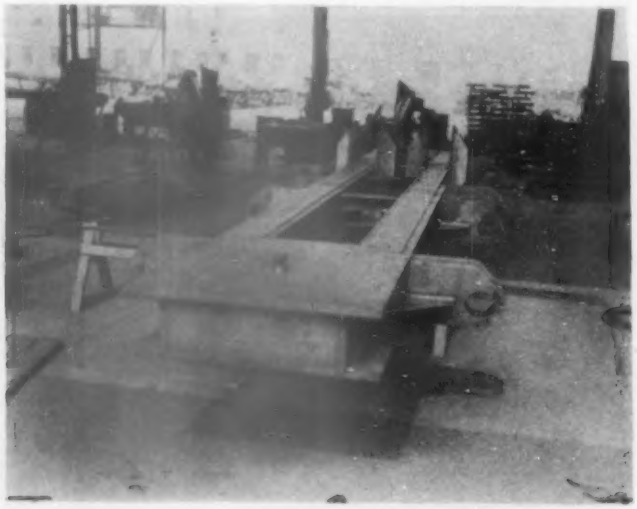


Fig. 7—Double outrigger and gusset at left; walking beam with its side plate and its three-gusset support

Fig. 8—Walking beam supports showing additional details of the heavy fillet welds which attach the gussets

having probably the heaviest trailer bodies ever built. Each one carries two 25-ton side dump bodies, built to dump on either side. The main longitudinal members (Fig. 6) were two 12-in. mild steel H-beams, weighing 65 lb per ft. They were positioned, upside down, and seven 12-in. H-beam cross members were welded to them. The bottoms were strengthened by the ½ by 8 in. plates shown in the picture (Fig. 6), which were attached by 1½ by ¾ in. slot welds at 12-in. intervals.

The dumping mechanism is carried by means of four double outriggers on each side of the frame. These outriggers were fabricated from 1-in. steel plate. They are 13-in. wide and extend 25-in. out from the frame. Because of the loads imposed upon them, they are gusseted with 12 by 15 by ½ in. plates. This insures their alignment. Incidentally, the hole for the shaft in these outriggers was flame-cut and subsequently machined to size (Fig. 7).

Another welded frame is a walking beam support, which is pictured in Fig. 8. To insure its rigidity, the walking beam support was reinforced with three gussets while the eye was reinforced with a double thickness of plate. The beams themselves were fabricated from 18-in. H-beams which were built into a double box section by welding ½-in. plates on each side. The walking beams are 86 in. long.

At the rear end, a water tank of about 70-gal capacity was formed by plates welded in between the main H-beams and cross members. The completed frame has 77 pieces of steel plate, held together with great strength and rigidity by hundreds of inches of expertly laid fillet welds.

All sorts of smaller and special welding and flame-cutting jobs are handled in the welding shop at the rear of the main building (Figs. 9 and 10). The shop is equipped with overhead rails and hoists, jigs and other fixtures, arc and gas-welding units and everything needed for such work.

To Build New Plant

Plans for the construction of another manufacturing plant to cost about $2,250,000 and a $650,000 sales and service branch on Los Angeles sites were announced recently.

These expansions are the answer of the Fruehauf Trailer Company to the question of "Where do we go from here?" It will require all of these new facilities at least to meet the postwar demand for truck trailers, say Fruehauf executives.

Fig. 9—The Fruehauf Trailer Company welding shop where four fulltime weldors do special work of all kinds

Fig. 10—In the welding shop, this weldor is lengthening a brake cam by welding in an additional piece

★ DESIGN

Railroad officials and car builders in ten cities will be given the opportunity to view this pioneer all-welded hopper car this spring. Its advantages are lighter weight and greater cubic foot capacity

New All-Welded Steel Freight Car

In the 11 years since the introduction of U.S.S. Cor-Ten, car builders and railroads have used this versatile high-strength steel in more than 65,000 freight cars of riveted construction with an average saving in dead weight of more than 2½ tons per car. Continuing its pioneering, the Railroad Research Bureau of United States Steel Corporation Subsidiaries now presents an all-welded, lightweight hopper car of the same material for inspection by railroad officials and car builders. This new car, built to order for Carnegie-Illinois Steel Corp., was first shown at Roanoke, Va., on April 2 and 3, and it will make subsequent appearances at other railroad centers, terminating in Chicago on June 19-21, inclusive.

The new hopper car is a wholly new design—not just a riveted design adapted for welding. The high strength of Cor-Ten and its superior atmospheric corrosion resistance have combined with the flexibility of welded fabrication to permit reductions in the thicknesses of certain sections and assure longer service life for the car. The all-welded joints simplify construction, provide tight seals against moisture and eliminate laps.

When empty, the new all-welded car weighs only 33,500 lb, a saving of 6,540 lb over the A.A.R. standard hopper car built of carbon steel and 1,500 lb over a riveted Cor-Ten car. This saving has been translated into increased cubic foot capacity, which allows more revenue freight each time the car is loaded.

Built from Subassemblies

In general, the car does not differ radically from the lines of the conventional A.A.R. standard design. For economy and simplification in fabrication, the use of standard sections and plates with straight trim and simple cold bends was one of the basic concepts of the design. Hot pressing and elaborate die work were avoided. The car structure is designed for subassemblies which will facilitate assembly and permit position welding. These subassemblies of underframe sides and ends are welded together to form the complete car.

Protruding structural members and seam ledges were eliminated from the interior of the car by means of outside stake side construction. The additional horizontal stiffness of this side framing compensates for the omission of the inside diagonal center braces. Such a smooth interior surface permits the free flow of material when unloading and helps avoid damage to the car by the mechanical devices used in unloading or loading. Ledges and pockets where moisture can collect are also eliminated, thus reducing the possibility of corrosive attack.

To obtain maximum unloading area in the hopper door openings and to reduce weight, a new, welded tubular center sill has been used. This facilitates the use of a one-door opening across the car. The tubular center sill is terminated at the face ends of the draft gear back stops. The face plates are welded to the ends of the sill, thus transmitting the buffing forces directly

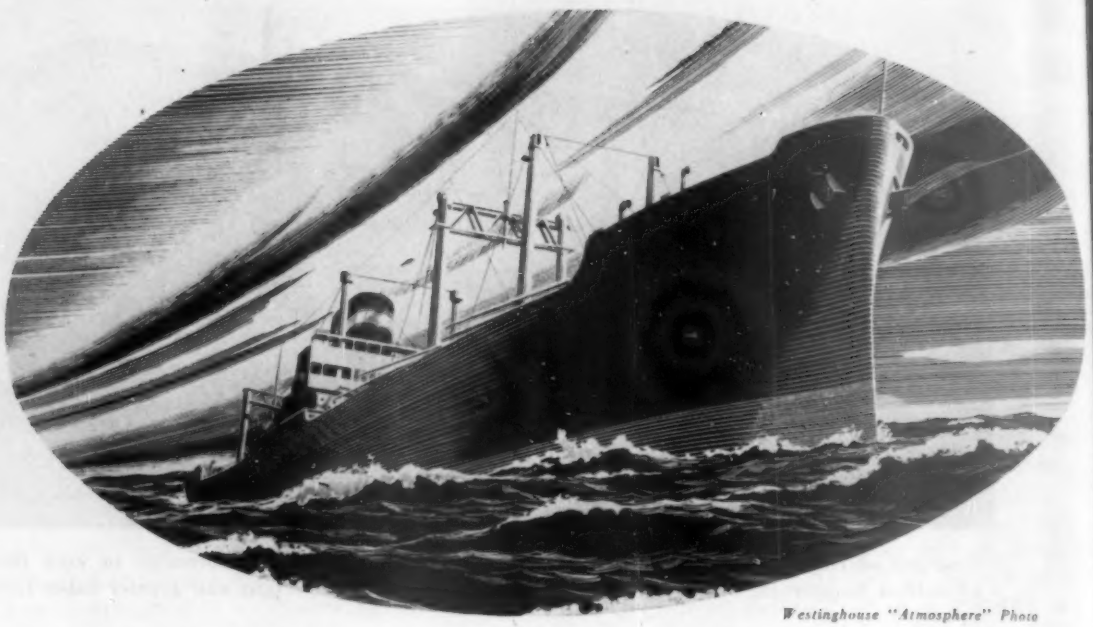
(Continued on page 48)

Table I. Comparative Welded and Riveted Data

	New All-Welded U.S.S. Cor-Ten Car	A.A.R. Std. Design, Carbon Steel
Light weight*	33,500 lb	40,040 lb
Inside length	34 ft, 2 in.	33 ft, 0 in.
Inside width	9 ft, 9⅛ in.	10 ft, 4 in.
Height	11 ft, 0 in.	10 ft, 8 in.
Cubic Capacity		
Level	2,273 cu ft	2,145 cu ft
10-in. heap.	2,553 cu ft	2,408 cu ft

** With one-wear wrought steel wheels*

★ CONSTRUCTION



Westinghouse "Atmosphere" Photo

Welding Sequence at Swan Island

BY FRANK ROBERT BAYSINGER*

PERHAPS too much publicity has been given Shipbuilder Henry J. Kaiser and his production records in ship construction, and too little written about the procedures that made possible a virtual assembly-line manufacture of ships. The earlier contracts called for partial riveted construction, but later hulls were 100% welded, and hence any increased efficiency in method directly or indirectly affected welding procedure.

Take, for example, the hull-erection sequence developed at the streamlined shipyard built at Swan Island, Portland, Ore. Not so very long ago, the Swan Island yard was engaged in building T2-SE-A1 turbo-electric tankers for the U. S. Maritime Commission. Earlier hulls had been built by the conventional method known as open-end sequence; *i.e.*, building forward, aft and up from a central starting point. But a tanker has a complicated bow structure, and most of the machinery is located in the stern. It soon became apparent that considerable delay in construction schedules was caused by waiting for the hull's construction to be completed from the middle to the ends before the machinery could be placed.

End-to-Middle Sequence

The obvious solution was to build the ends and the middle of the ship's hull simultaneously and weld them together as the hull neared completion.

★ Part One—Most important of the procedures that made possible the assembly-line manufacture of tankers at Henry J. Kaiser's Swan Island yard was the end-to-middle sequence. Mr. Baysinger tells why and how it was developed.

Accordingly a new hull erection sequence that came to be known as the "end-to-middle" sequence was evolved. The development and successful application of a sequence which erected a hull in three parts marked a radical departure from all formerly established shipbuilding custom and constituted one of the major advances in shipbuilding technique developed during the war.

The scope of this article is concerned with the development of the end-to-middle sequence, and the difficulties which had to be overcome before it could be placed in successful operation. That the new technique, as approved by the American Bureau of shipping, is sound engineering is evidenced by the fact that there were no fractures in the ship structure traceable to stresses resulting from the revised welding sequence. From a production standpoint, a steady reduction in construction time and cost as a

* The author wishes to express appreciation to Albert Bauer, assistant general manager, Kaiser Co., Inc., Portland, Ore., for the material used in this article.

direct result can be verified from company records.

Dimensions and Displacement

The T2-SE-A1 design tanker, of which 147 were built at the Swan Island Yard, is a turbo-electric drive ship of fluted Isherwood bulkhead and longitudinal framing construction. It is 523 ft in overall length, 68 ft in beam and has a depth of 39 ft, 3 in. to the upper deck at the sides. Displacement at the ocean freeboard draft of 30 ft, 2 in. is 21,880 long tons, and the total oil-carrying capacity is 6,337,000 gallons.

Equipped for wartime operation, this tanker required a total of 4,842 short tons of fabricated steel and 352,000 lineal feet of automatic and manual welding. From a construction standpoint, it is classed as a complicated ship.

The majority of man-hours required in building a ship involve flame-cutting, shipfitting, pneumatic chipping and arc welding. As welding is the largest single craft, the whole ship-erection sequence was planned to obtain optimum welding production.

Bigger Sections

It is axiomatic that welding in the flat position produces the greatest lineal footage per man-hour; hence the more work which can be fabricated flat, the higher the rate of welding production. Although the fabrication of sections on a flat slab has been used by shipbuilders for almost a century, the scale to which it was developed in Kaiser yards far exceeded any prior usage. The only limit to the size of the sections was the load capacity of the cranes, and even this capacity was tripled by placing cranes so that three of them could be used simultaneously to handle a single lift. Where a prefabricated section of 20 tons might be considered large by the ordinary shipyard, sections weighing in excess of 70 tons were commonplace at Swan Island. Not infrequently sections weighing up to 200 tons were assembled and placed aboard the hull in one unit.

The high productivity of the Kaiser yards, however, cannot be attributed to the efficiency of materials handling alone. The Kaiser expediters were not only concerned with the flow of materials within the yard themselves, but also with the movement in transit through the supplier's plant and even, in some instances, with the acquisition of the machine tools used in the manufacture of critical parts. Thus a shipbuilding sequence based upon maximum welding productivity coupled with an ambitious system of expediting was the essence of the Kaiser method of shipbuilding.

As Swan Island was the last Kaiser shipyard built, the engineers who planned its layout were able to take full advantage of lessons learned by their predecessors. Kaiser's Oregon Shipbuilding Corp. yard (ten-day Liberty ship), for instance, was originally built along the same plan as previous yards, and it was found that there were many hindrances to production in the system used. The essential features of the ordinary shipyard (Fig. 1) include a storage area, a plate shop, slabs and the ship ways. Materials come into the yard and are placed in storage. From here they go to the plate shop, where the plates are cut, rolled or shaped for assembly into sections on the slab. The completed sections are then placed aboard the hulls on the ways.

Cranes and Storage

It was found that production both on the slab and on the hulls was being hindered by lack of crane facilities. The "whirley" cranes could not concurrently supply material to the slab, turn the sections being fabricated, transport sections and other material to the ways, place machinery and tend miscellaneous rigging on the hulls. The situation was alleviated by installing an overhead crane above the slab and adding a roof in place of the portable shelters used against western Oregon's annual 45-in. rainfall.

At this point a new difficulty arose. The increased crane facilities made it possible for the slab (renamed "assembly") to assemble sections far faster than the ways could handle them. As progress studies indicated a widely varying daily tonnage placed aboard the hulls, it was obvious that assembly production could not be regulated to fit the convenience of the ways. If the assembly produced at maximum efficiency, it would be piled high with sections until the work area was restricted. It it attempted to govern production in accordance with the daily needs of the ways, many man-hours would be lost in idleness. A way between the horns of the dilemma was found by the

A T2-SE-A1 tanker takes to sea. Embodying latest designs for speed, safety and operating economy, this tanker is classed as a complicated ship to build. A sequence which erected the hull in three parts greatly speeded production

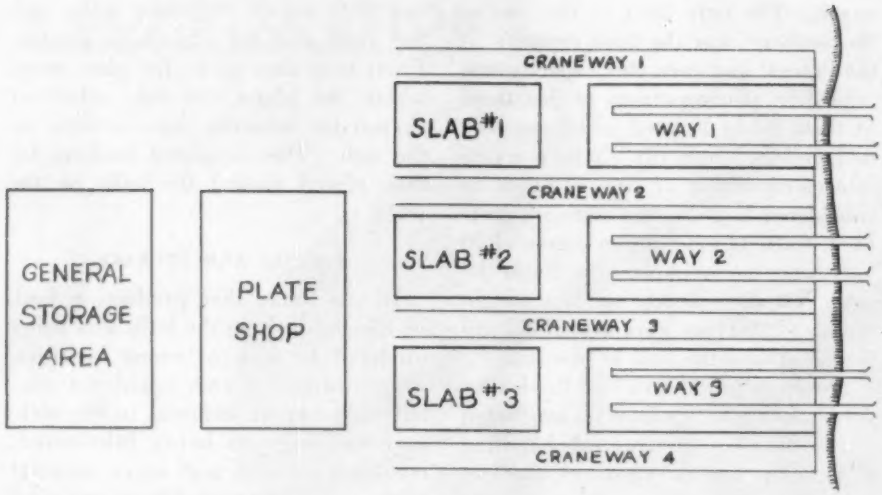


Fig. 1—Diagrammatic sketch showing working areas of an ordinary shipyard

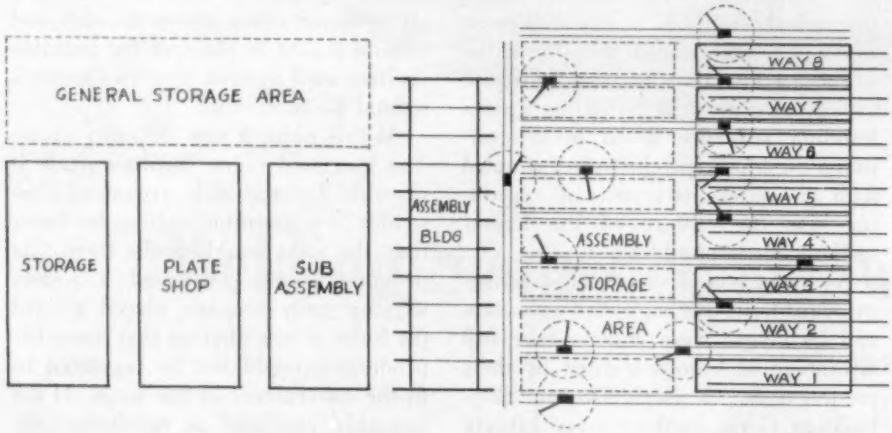


Fig. 2—General plan of the working areas at Swan Island. Materials move in one direction and flow in continuous lines from general storage through storage, plate shop, subassembly, assembly and assembly storage to the ways

addition of an adequate storage area where assembled sections could wait placement aboard the hulls.

Swan Island was the ultimate in the development of this system (see Fig. 2). Materials moved in one direction and in continuous lines from the storage area, through plate shop, pipe shop, machinery assembly and service shops to subassembly, assembly and assembly storage and thence to the ways.

Of the 352,000 lineal feet of welding in a T2-SE-A1 tanker, approximately 60% were welded in subassembly and assembly where work could be conveniently positioned for the maximum in efficiency and technique. Here the steel was relatively free to move in any direction, and the welds could be made toward free ends. Hence the problem of locked-in stresses was not the same as the one arising when the erection sections and shell panels are welded into the hull and welding has to be pyramided and balanced so that hull lines are maintained.

The Welding Bottleneck

During the construction of the early hulls, this method of pyramiding the erection of the entire hull from a point beginning with the keel sections midships was the controlling factor in the scheduling of all other crafts on the ways and outfitting dock. During a large part of the construction period, therefore, hull erection and welding could progress on only two fronts.

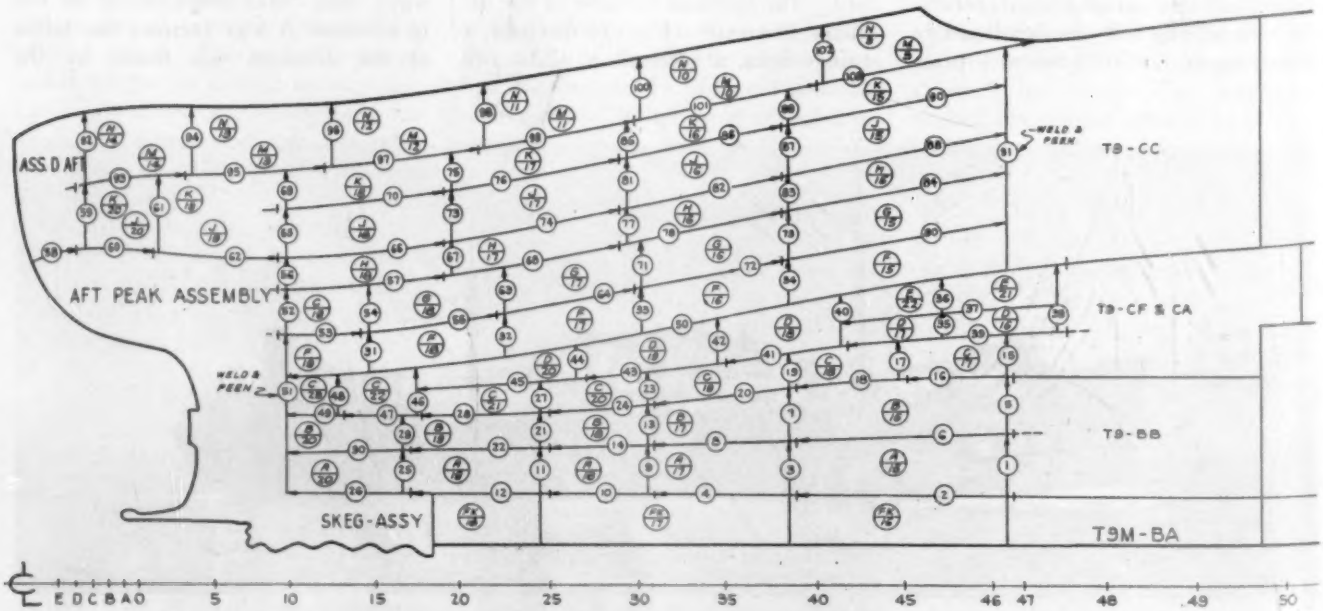


Fig. 3—Aft end shell expansion drawing of T2-SE-A1 tanker. The numbers in circles indicate the order in which welds are to be made. The numbers and letters indicate the strake and plate numbers. Arrows show welding progression

Since welding causes a certain amount of variation in the final location of bulkheads and machinery foundations, the installation of pipe and machinery had of necessity to follow in turn. To cite a specific example, the welding of the shell butts and seams in the aft end must be completed above the steering gear flat before the final location of the stern frame is established and boring of the stern tube can begin. Alignment of the shaft follows the boring operation and must be done before the bearings can be finished. Setting and checking of the electric propulsion motor cannot be done until the shaft and bearings are checked. Consequently any delay in the welding of the shell plate at the beginning of this particular sequence aggravates crowded schedules of dependent crafts, and locations where work is already congested become even more of a bottleneck.

"Hot Spots" Show Up

During the days when the ships "just grew" to the finished point, these critical locations were not apparent, but as work became more routine and schedules could be speeded up to meet increased delivery demands, they began to show up as "hot" on every ship. Time studies and journeyman analysis of these points where barnacles grew in the bottleneck showed that the difficulty was primarily because too much work and too many crafts were being concentrated in a single location.

In the T2-SE-A1 tanker, the propulsion equipment and 85% of all pumps and machinery are located aft of the after cofferdam protecting the cargo tanks, and thus the hull proper had to be approximately 80% erected before machinery installation could begin. It became evident that because of these limiting factors on fitting and welding (as well as the other crafts which were forced to remain in line behind them) the yard had reached its maximum in production speed regardless of manpower efficiency.

At this point a separate department was created to study the possibilities of a radical change in the construction sequence of the hull with close attention to its bearing on accepted welding practices.

(To be continued next month)

Welded Press for Molding Rubber Articles

A REVOLUTIONARY type of hydraulic press for the production molding of both natural and synthetic rubber is being manufactured by The Hydraulic Press Mfg. Co., Mount Gilead, O. The H-P-M "Turbojector," as it is termed, injects rubber into a hydraulically clamped mold by means of a motor-driven feed screw. The maximum nozzle contact pressure during injection is approximately 6,000 lb, permitting injection pressures of as high as 18,000 psi on the material to be molded.

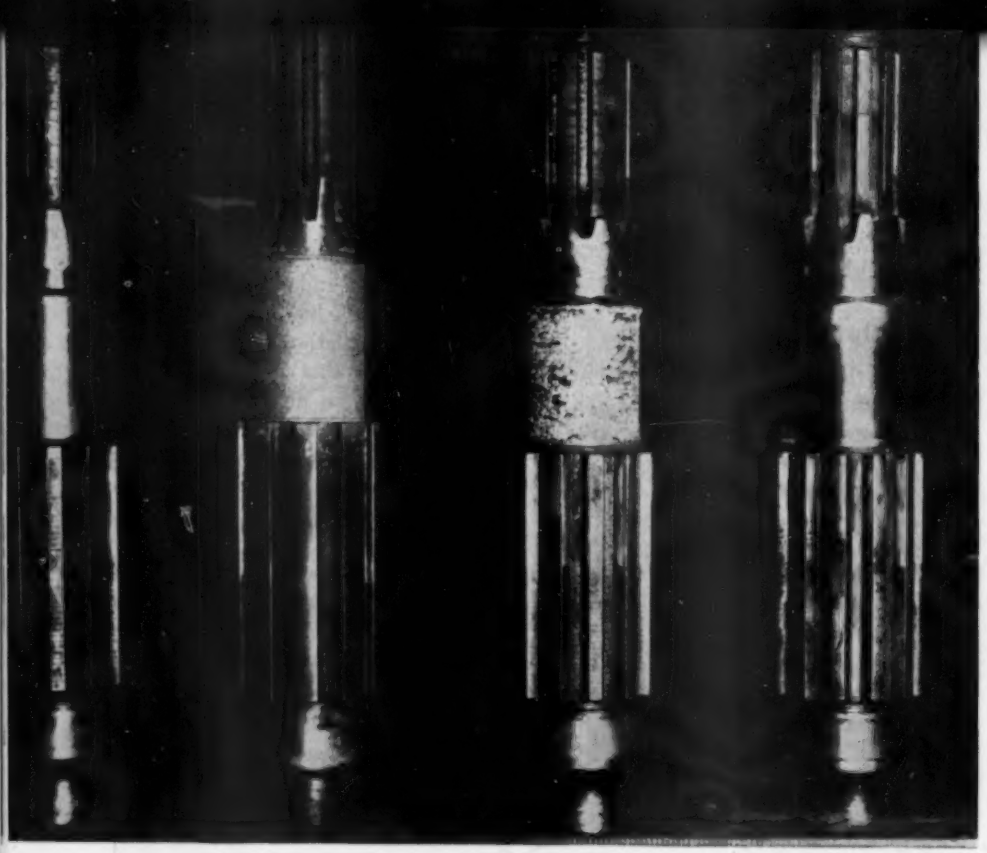
As the accompanying picture shows, the new Turbojector is a wholly self-contained unit, requiring only power and cooling-water connections. The bottom of the base serves as the oil reservoir, and directly over this are mounted the radial-type oil hydraulic pump and the electric driving motor. The leakproof construction of the base, which permits it to hold oil for an indefinite period, is made possible by welding.

Most of the welds in this large unit are made by an automatic welding machine of the submerged-melt type. The machine parts are flame-cut from plate steel ½ to 1 in. thick and are formed to give the rounded corners shown in the picture. Inside the frame, Z-shaped ribs of ½-in. plate are welded manually to give rigidity and a sturdy construction.

The Turbojector is designed for injection molding of a wide variety of mechanical rubber parts such as O-ring gaskets, rubber bushings and automobile engine mountings. Experimentally, it has molded up to 8 lb of rubber per "shot." The machine is said to have overcome many of the handicaps of conventional compression molding.

The rubber, in strip, pellet, ribbon or rod form, is fed into the injection cylinder by the feed screw, which meshes with a set of baffle gears as the rubber advances. These act as pressure locks. The action of the screw and baffle gears forces the rubber into the nozzle. The frictional heat produced in the injection chamber raises the temperature of the rubber as high as 300 F. Additional heat for rapid curing cycles is secured at the nozzle by employing an electrical resistance band heater.

H-P-M "Turbojector" for the injection molding of rubber parts. Base is a welded unit



U. S. Army Signal Corps photo

The four stages of rebuilding a transfer case idler shaft from a G.M.C. transfer case. Left to right: as-worn condition with the surface scored by the action of needle bearings; shaft after it has been undercut and electric bonded; shaft after it has been metallized; the completed job after grinding

Metallizi

★ Part Two — "Wally" Meyer, one of two men sent out from the United States to install metallizing equipment at G.I. automotive maintenance plants and instruct native operators, continues his saga of true adventures in Burma, China and Italy.

WHILE ENROUTE from Ledo to China we made one stop at Myitkyina, Burma, to install equipment in the shops of the 885th Ordnance Heavy Automotive Maintenance Company. Here, under the command of Major Earl T. Klay, we found a very hard-working ordnance battalion, whose duty it was to maintain all equipment along 900 miles of the Stilwell Highway. They were superbly organized and extremely efficient.

METALLIZING JOBS IN BURMA

Captain Marlowe Francis, of St. Paul, Minn., and his assistant, Chief Warrant Officer Stephen Mittle, of Chicago, directed the efforts of the 885th Ordnance Heavy Automotive Maintenance Company. They surmounted the obstacle of manning a shop designed for operation by one company with but a platoon of men. As a result, every motion counted and every minute of every hour was utilized to its fullest extent.

Walter B. Meyer and T/4 James Urian of the Unit Reconditioning Plant at Kunming. The turntable for spraying crankshafts was built from a jeep rear end assembly

Here we had the unsurpassed thrill of seeing a job metallized, installed on a vehicle and driven away in a matter of hours. Necessity dictated some rather unusual jobs such as the metallizing of king pins, spindle bolts, valve faces and the inevitable flanges and yokes.

One unusual job, suggested by one of the enlisted men, consisted of returning to use the worn constant mesh gears and idler shafts of G.M.C. transmissions. These gears rotate on the shaft by means of 32 needle bearings, each of them ⅛ in. in diameter. In due time, either the shaft or gear became too badly worn for further use. Since very few replacement parts were available, some other method of reclamation had to be found or vehicles would remain idle.

It was finally decided to bore out the hub of the gear and build up the idler shaft by metallizing to accommodate 33 needle bearings instead of 32. This procedure was quite satisfactory and was resorted to whenever necessary.

A very capable group of enlisted men composed of S/Sgt. Ray Cravens, Borden, Ind., T/3 William Bechtel, Cleveland, T/4 Clarence Lilienthal, Brook Park, Minn., T/5 Ray Klein and T/5 Warren Johnson, operated this installation. The versatility and ingenuity they displayed are beyond imagination.

GIVE POSTGRADUATE COURSES

Along our overland jaunt into China, we instructed two engineering units who already possessed equipment in advanced metallizing technique. One of these shops, the 1575th Engineers Heavy Shop Company, under the command of Captain Morgan, was located

zi oes G. I.

BY WALTER B. MEYER

Engineer, John Nooter Boiler Works Co., St. Louis

A request from the U. S. Army officials in the India-Burma theatre for two technicians versed in the ramifications of metallizing found its way to the Pentagon Building at Washington, and thus began a long adventure for two wandering sprayers of metal.

Walter B. Meyer and Thomas H. Lufkin, the two-man team sent to India, Burma, China and Italy, traveled by Air Transport Command through lands famed in fable and history. In the first part of this article, published in the April issue of THE WELDING ENGINEER, *Mr. Meyer told of their work at the giant R-3-A plant at Calcutta, where motor vehicles were repaired without the aid of replacement parts and restored to service on the "Road."*

From Calcutta, the two metallizing experts were sent to Chabua, a little town in the upper part of Assam Province through which passed all mobile equipment and supplies for everything and everyone beyond. The work at Chabua was soon completed, and "Wally" and his partner began their long trek through the Burmese jungles to Kunming, the back door to China. In his final installment, Mr. Meyer now tells of their joint experiences in China and of his own subsequent solo assignment in the Italian theatre—The Editors.

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in Myitkyina, Burma. We gave them additional equipment and showed them what could be done in the way of metallized repairs. Very shortly the equipment was put to work on additional shifts to rebuild worn parts from tractors, graders, shovels, trucks, pumps, air compressors and earth-moving equipment.

BURMESE JUNGLE SHOP

At Shingbuyang, in the heart of the Burma jungles, was located the 497th Engineers Heavy Shop Company under the command of Captain Walker. This outfit, known locally as "Little Peoria," had acquired an enviable reputation for its herculean efforts in the maintenance of road-building equipment. The 497th had long employed metallizing equipment in the rebuilding of a variety of items. We provided an electric-bonding unit, which they had previously lacked, and briefly assisted them to enlarge their metallizing activities.

Of particular value was the reclamation of steering brake drums, crankshafts, idler shafts, sprocket shafts, reverse idler gears, gear and pinion shafts (on surfaces worn by oil seals), valve stems, brake cams, generator shafts, pistons, camshafts, universal joint crosses, clutch throwout shafts, steering arm spindles, fuel pumps, drive shafts, equalizer cranks and a score of other critical parts.

At the one installation of the 1575th Company, more metal was sprayed than at any two other combined installations in the theatre. Keeping them supplied with wire turned out to be a terrific problem.

WE COME TO CHINA

We finally arrived, somewhat bruised and weary, in China. At Kunming we were assigned by S.O.S. Headquarters to begin operations at the Unit Reconditioning Plant. This establishment, operated by military personnel and Chinese employees, was under the command of Lieutenant Colonel Adam Kleiber, formerly fleet operator for the Air Reduction Sales Co., New York City.

PARTS MADE BY HAND

Colonel Kleiber's past experience with metallizing made this an easy job for us. To him and his men fell the stupendous task of repairing major assemblies for all types of vehicles for our army, the Chinese army and numerous other organizations. His plant capacity was far from adequate, spare parts were at a premium and his manpower was utterly insufficient for the tremendous job that had to be done.

Many of the necessary items, such as gas-line fittings, nuts, pins, etc., had to be laboriously made by hand. Timing chains were refitted by hand to take up the slack, springs were hand forged and tempered in an ingenious gas furnace of their own design.

CRANKSHAFTS IN DISREPAIR

The metallizing equipment had already been installed in a room specially erected for it. On hand were several hundred crankshafts from Chinese-

Close-up of the crankshaft turntable showing the driving mechanism

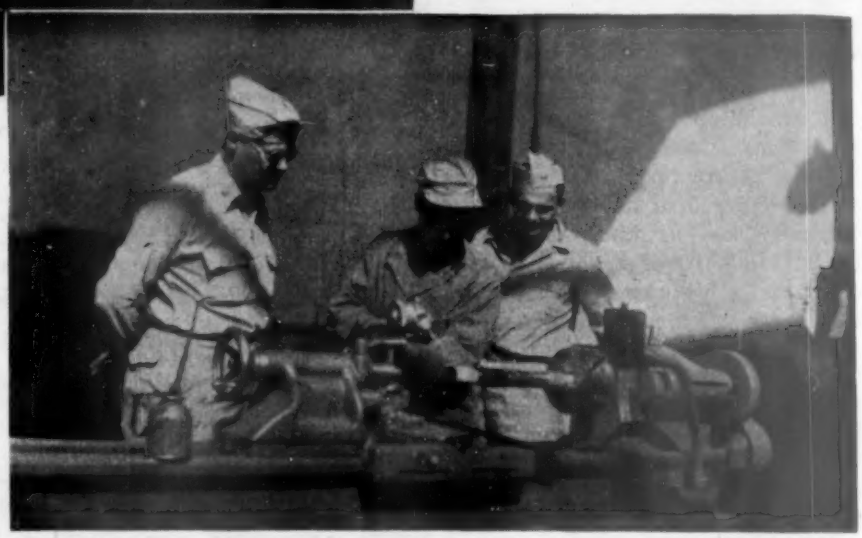
T/4 James Urian operating metallizing equipment at the Kunming reconditioning plant

owned, American-made vehicles brought in before the Japs closed the Burma Road. These vehicles were in varying stages of advanced disrepair; the crankshafts were in a particularly bad condition. On hand, however, was a large Van Norman crankshaft grinder, which ideally facilitated the metallizing of these critical parts.

We were also fortunate in being permitted to train four highly skilled mechanics, who were finished machinists of long standing in civilian life. These men were S/Sgt. Harry Winship, machine shop foreman, of Hamilton, Ga., T/4 Daniel J. Cermak, of Baltimore, Md., T/4 Roderick MacKenzie, of Littleton, N. H., and T/5 James Urian. They were all very proficient in the operation of the equipment and were soon performing like veterans.

Jeep-Powered Turntable

Rod MacKenzie constructed an ingenious turntable for rotating the crankshafts for electric-bonding and metallizing operations. It was fabricated of a jeep rear axle assembly. The longer side of the housing and axle were cut off and the spider gear welded shut. It was then mounted vertically in an angle iron frame. An abandoned lathe faceplate was mounted on top the vertical axle, and the crankshaft was attached to the faceplate, through its flange, in such a manner that either the connecting rods or main bearings could be centered on the pivotal point. The unit was driven by a pulley attached to the flange on a stub drive shaft and belt-driven by a motor.



Major H. H. Flohr-Matthiessen, reclamation officer of the Mediterranean Theatre of Operations; Private Homer W. Rawlings, Base Shop No. 3, Leghorn, and Mr. Meyer. The equipment shown was set up at Base Shop No. 3, operated by the 603rd Ordnance Base Armament Maintenance Battalion

China Lacked Supplies

An attempt was also made to set up an installation at the 857th Ordnance Heavy Automotive Maintenance Company at Chan Yi, China. However, the lack of adequate compressed air, acetylene and oxygen doomed these efforts to failure. Equipment and supplies were at a premium in the China theatre, for all of them had to be passed over the already overtaxed facilities of the two "Hump" transport routes.

Tommy Is Hospitalized

On our way back we revisited installations set up along the route and tabulated results. In Ledo, Tommy Lufkin was in an automobile accident which almost cost him a leg, and I carried on alone. Fortunately, the job in China, Burma and India was completed after one more installation at the 898th Ordnance Heavy Automotive Maintenance Company at Ledo.

A brief recap from the records of the various units in which metallizing equipment was installed revealed that a total of 4,617 known items were reclaimed in approximately four months' time. Of these, 2,477 were critical items, the lack of which would have rendered a piece of equipment inoperative.

It is extremely difficult to set any figure as to the exact number of pieces of equipment that were returned to immediate operation because of metallizing. Oftentimes such "deadlined" vehicles lacked several replacement parts, some of which could not be reclaimed by metallizing. However, various estimates have set the figure at between 1,200 and 1,800. Whatever the figure may be, Tommy and I were both warmly thanked for the work we did in making the job easier for this grand group of men.

A list of the various items reclaimed by metallizing is given on page 47.

Items Reclaimed

Pillow block differentials...	387
Transmission flanges	1,019
Front and rear axle flanges..	172
Transfer case flanges.....	461
Differential flanges	457
Harmonic balancers	1,285
Buda crankshafts	12
Hercules crankshafts	5
Continental crankshafts	7
Ford crankshafts	1
Caterpillar crankshafts	27
Dodge crankshafts	263
Refrigerator crankshafts ...	4
Lister Diesel crankshafts (English make)	3
Propeller shafts	4
Transfer case main shafts...	13
Transmission main shafts...	108
Armatures	41
Jeep axles	21
Differential pinions	3
Bogie idler shafts.....	42
Steering brake drums.....	7
Reverse idler gears.....	11
OuNan crankshafts	140
Briggs and Stratton starting motor crankshafts	76
Idler shafts	22
Sprocket shafts	31
Generator gear	1

Wally Goes to Italy

From India my path led to Italy. I departed from Karachi on a C-54 cargo plane that was bound for Cairo. We paused briefly in the stifling heat of Iran, at Abadan, where the Persian Gulf Command was operating a fantastic supply route up into Russia. Finally, the refreshingly green delta of the Nile came up over the horizon and the plane landed on Payne Field, just outside of Cairo. I had time only to snatch a few badly needed hours of sleep and to catch a fleeting glance of the pyramids and the sphinx.

Civilian Italian employee of the U. S. Army metallizing a large crankshaft at Base Shop No. 1. This shop was located at Bagnoli, Italy, on the Bay of Naples

Very shortly, I found myself a passenger on board a C-47, winging away over the blue Mediterranean. We passed high above the salmon-colored island of Crete, scene of Germany's vicious airborne invasion, and landed briefly at Athens. The airport at Athens was a shambles of twisted hangars, demolished buildings and bomb-pocked runways.

Our stay at Athens was quite brief, and we were shortly flying over the island-studded waters of the Ionian Sea bound for Naples. Our landing approach to the airstrip at Naples took us over the very summit of the then dormant Mt. Vesuvius.

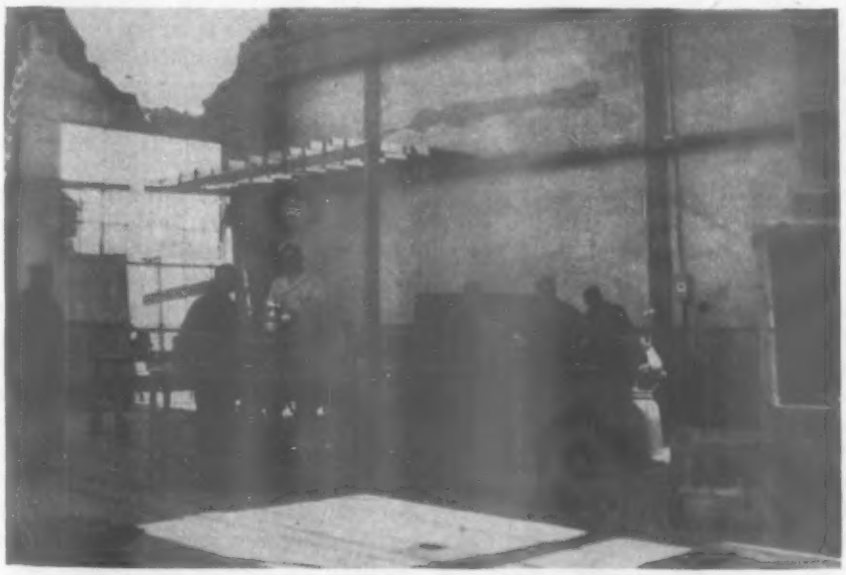
Finds "Factory" Production

Upon reporting to the Allied Forces Headquarters at Caserta, Italy, I was placed under the guiding hand of Major H. H. Flohr-Matthiessen, theatre reclamation officer and former fleet operator for the Texaco Oil Co. His great foresight, careful planning and pleasant company made my sojourn in Italy a very pleasant one.

By comparison to Army installations in the far east, those in Italy were veritable "State-side" factories. That which was done, on a smaller scale, in Burma by two hundred men was grandly turned out in mass-production centers in Italy by five thousand men. Manufacturing processes were carried on in the true American style. Shortages were not so acute, and the supply line was eight thousand miles shorter, and had no cumbersome overland routes. Italian employees and German prisoners were a valuable source of skilled help.

The Italian population bore the look of a people who had been blasted to insensibility. Water supplies, sanitary facilities and electrical service had been disrupted. Land mines and booby traps were a constant hazard . . . This is part of the terrific price a whole nation of people is paying for following the glittering tinsel of a false political creed.

My first assignment was the installation of equipment at Base Shop No. 3 in Leghorn. This shop, manned by the 603rd Ordnance Base Armament Maintenance Battalion, under the command of Lieutenant Colonel A. F. Zitewitz,



General view of the metallizing installation at Base Shop No. 3. This shop was set up in a bombed Italian torpedo plant—note the blasted wall

of Chicago, was doing a tremendous job of overhauling vehicles, tanks, artillery, small arms and precision instruments preparatory to transferring them to the still active Asiatic theatre.

This huge shop was set up in the debris of a shattered Italian torpedo plant. It was manned by several thousand American soldiers aided by Italian civilians and German prisoners.

In Italy, my metallizing activities were carried on in the form of schools, to which would be drawn men from the surrounding units. To these chosen soldiers would be given seven or eight days of concentrated training on the use of the equipment and the application of the process. They, in turn, were to utilize their training back in their home units. Among the men who stood out at Leghorn, were S/Sgt. Wayne Tinker and Pfc. Homer Rawlings. Several crankshafts for power generating units were reclaimed during the brief activities at this base.

Base Shop No. 1

My next effort was at Base Shop No. 1, located at Bagnoli on the beautiful Bay of Naples. Here operated the 605th Ordnance Base Armament Maintenance Battalion, under the command of Major J. S. Lipscomb. This outfit made an enviable record for itself during the entire North African campaign and in the early stages of the invasion of Italy. During that time it performed miracles in the repair of tanks, artillery, vehicles, power plants and a multitude of odds and ends that require the attention of a mechanical genius. The outfit had been called upon to repair everything from dental and surgical instruments, to bomb sights, to huge dockside equipment.

Base Shop No. 1 had long utilized its metallizing equipment for the rebuilding of various crankshafts, flanges and yokes. It was subsequently provided with electric-bonding equipment and embarked upon a program of rebuilding ordnance parts.

The metallizing equipment was operated by an elderly Italian civilian in the employ of our Army. He was known to one and all as "Pop" and was quite clever at making queer set-ups and in operating the left-handed Italian machine tools.

Several outstanding operators were trained. Among them were S/Sgt. Thomas C. Colson, S/Sgt. S. S. Snidow and S/Sgt. Scott Stewart.

Italian operator preparing to metallize an OuNan crankshaft at Base Shop No. 1, Bagnoli, Italy

Last Operation

My next and final operation was at Base Shop No. 2, located at Caserta, just north of Naples. This shop, commanded by Major Lee Minter, was operated by the 125th Ordnance Base Automotive Maintenance Battalion. Among the men sent there for metallizing instruction was Lieutenant LeRoy Owen, attached to General Mark Clark's Fifth Army, who had served at the fabulous "Willow Run" vehicle repair plant at Florence. Lee proved exceedingly adept at the operation of metallizing equipment and suggested a procedure for making gaskets of asbestos metallized with copper. This stood us in good stead when the shortage of such items developed.

Base Shop No. 2 had long been engaged in the metallizing of flanges and yokes. During my stay an unusual shortage of these parts occurred, and a double shift was employed in the metallizing department. This operation was turned over to German prisoners of war under the direction of Corporal William Mull, Staff Sergeant Paul W. Keller and Private Jay G. Barber. All three of these men had previously received instructions in our school.

In closing, I want to pay tribute to the average American soldier and particularly to those technical sergeants in our service troops—and to the work that I have seen them do under the most trying circumstances.

Leaving Italy, I flew over the wreckage-strewn shores of Sicily and North Africa to Casablanca. From there I flew to Washington via the Azores and Newfoundland. As I climbed wearily off the giant airship in Washington and set foot on the beautifully trimmed grass of the airfield, I looked around at the immaculate cleanliness of our own country and thanked God.

THE END

All-Welded Freight Car

(Continued from page 39)

to the full cross-section of the center sill. Standard Z-26 draft sills extend from the bolster to the end of the car to form a draft gear pocket of standard dimensions. The draft sills are secured to the tubular center sill by welds of strength equal to the full cross-section of the sills. All of these welds run parallel to the line of stress.

The hopper sheet, which is formed by two simple cold bends, extends in one piece from one side of the car to the other. Its sloping sides engage and are welded to the corresponding slopes of the angles forming the bottom chords of the side girders. Specially designed longitudinal braces extend from the bolster to the end sheet and assure stiffness. The body bolster is made up of a Carnegie wide-flange beam with a pressed plate extension on the top flange. The latter facilitates the connection to the sloping floor sheet and provides a more yielding contact between the floor and the bolster.

Side Subassemblies

Each side is a main subassembly. The side sheeting is made up of two longitudinal sheets, the heavier being in the lower portion as this encounters the greater wear and abuse. The heavier sheet extends from bolster to bolster and serves as a framing member for the attachment of all cross members and floor sheets. The upper sheet, of lighter gauge, also extends from end to end of the car. These sheets are welded to a frame structure consisting of channel-section vertical posts and top chord and an angle-section side sill or bottom chord. The latter is inclined to provide the proper slope for the attachment of the hopper sheets. It forms a water-shedding shelf.

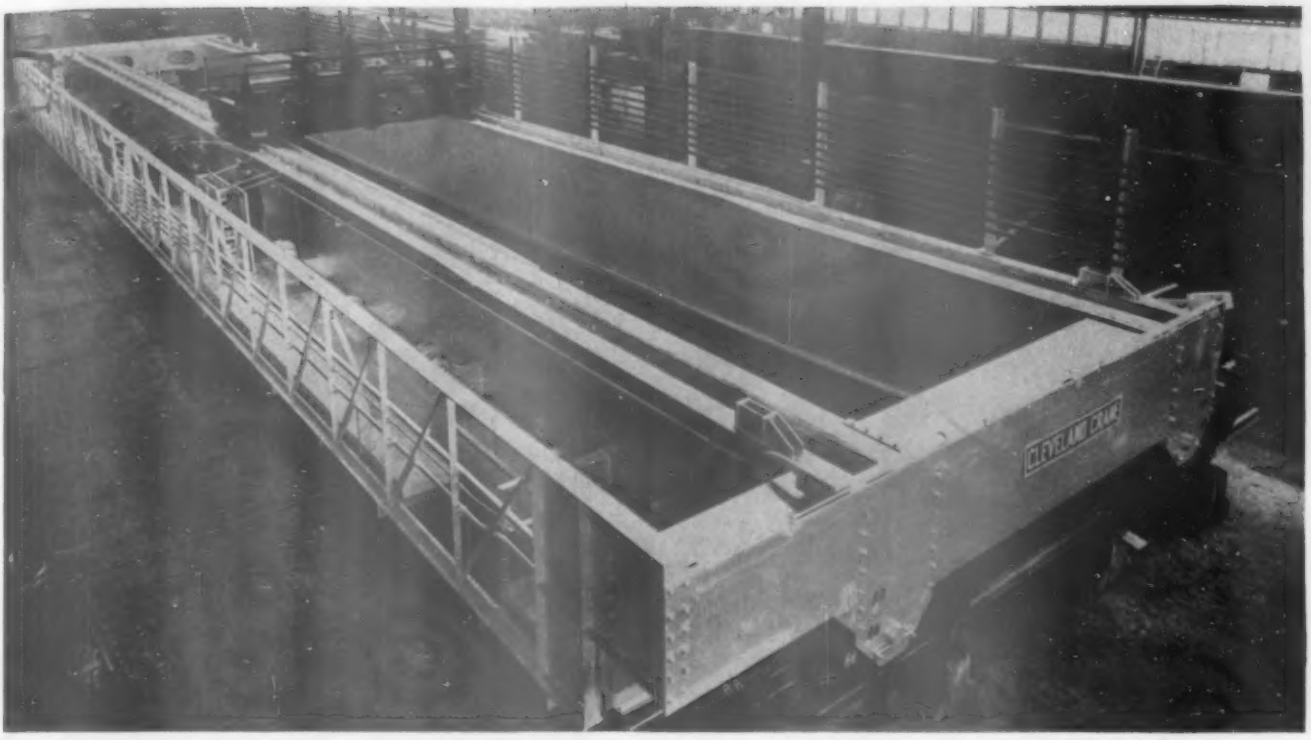


Fig. 1—A 30-ton overhead crane having a span of 120 ft. These cranes are assembled before shipment to assure fitting

Welded Cranes and Heavy Machinery

BY CLYDE B. CLASON

ONE OF THE largest users of steel in northern Ohio (average consumption of around 500 tons per month), The Cleveland Crane & Engineering Co., Wickliffe, O., is also a pioneer in the advocacy of welded design. Cleveland overhead traveling cranes are of all-welded construction throughout: the company refuses to quote any prices on a riveted job.

This article tells why Cleveland Crane & Engineering is enthusiastic over all-welded construction for its overhead cranes, Tramrails, shears and bending presses.

In Business Since 1898

Cleveland Crane & Engineering started the manufacture of overhead cranes as long ago as 1898. In 1920 it began producing Cleveland Tramrail equipment for lighter overhead materials handling systems. In 1930 the company's heavy machinery division was organized to manufacture Steelweld presses, and in 1945 metal-cutting shears were added to the Steelweld line.

The big girders for overhead cranes and the heavy frames for shears and bending brakes are fabricated in the company's structural shop, which is located in a separate bay from the main plant. The structural shop has ten weldors and three flame-cutters, working under the direction of P. Matteo, superintendent, and William Landon, assistant superintendent. Mr. Matteo, it should be noted, is a veteran of 40 years' service with the company. All of the weldors and flame-cutters are skilled, experienced men, most of whom are trained from scratch by Mr. Matteo or Mr. Landon.

Equipment in the structural shop includes 24 arc welders, of which 16 are 500-amp a-c machines, and an automatic welding crane. There are also three flame-cutting machines (one a four-torch unit) and a power-driven shear. These flame-cutting machines will do either straight-line or shape cutting in plate up to 18 in. thick. The shear, a unit of the company's own manufacture, has a maximum capacity of ¾ in. by 10 ft.

Welding of Tramrail trackage is not done in the structural shop, but in the main plant. The Tramrail shop has seven welders, of which five are d-c and two a-c.

Girders for Overhead Cranes

Cleveland overhead cranes are of various capacities up to 300 tons. A 30-ton model having a 120-ft span is shown in Fig. 1. Welded construction

Fig. 3—The simple splice below was designed by Cleveland Crane engineers for girders shipped to Brazil

is used throughout, including the girders. No wood is employed for the cab or any other part of the crane.

Welding imparts a smooth, streamlined appearance to the crane because of the elimination of surfaces studded with rivets. The chief advantages of all-welded construction, however, are the greater rigidity and more favorable weight-strength ratio it provides.

Crane girders vary up to 120 ft in span, 8 ft in depth and 4 ft 0 in. in width. In weight, they may range up to 50 tons. To fabricate structural members of these giant dimensions is a task that calls for the utmost in skilled workmanship and technical know-how as well as an extensive investment in modern welding equipment.

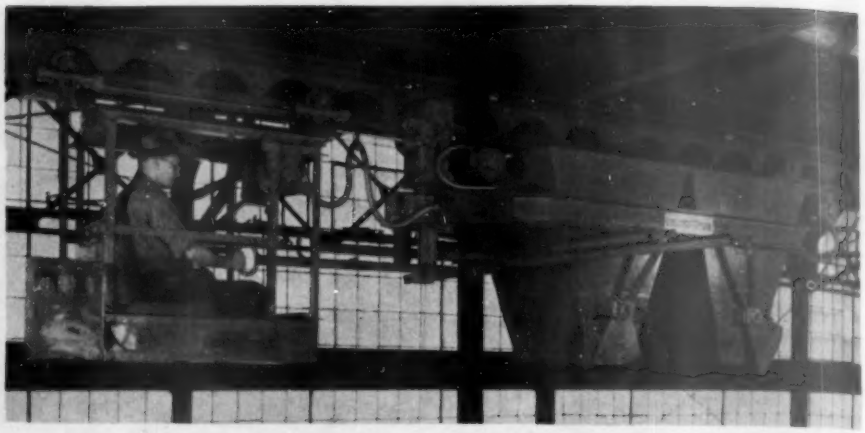


Fig. 4—Bucket crane traveling on overhead Tramrail. The arches are sheared from standard I-beams and are then welded to the high-carbon-steel rails

Automatic Welding Gantry

Box girders are welded automatically—both webs at once—by means of a specially designed welding gantry (Fig. 2). The two welding heads are secured to units which are adjustable up and down and crosswise, and these are in turn supported by a Tramrail gantry crane. Freedom of movement is thus assured in three dimensions. The welding heads travel without sway or vibration, welding a straight, accurate seam on both sides of the box member. The heads remain rigid in any position and can be adjusted to any height within a 4-ft range.

Besides the two welding heads, the hoist load bar carries the control instruments and twin reels of welding wire. The two welding transformers are carried on the platform below the gantry legs, and conductors and collectors are located below the upper crane truck at the wall. A vacuum filter (see Fig. 2) is mounted on the gantry to remove welding fumes.

Welds can be made of any length, up to the length of the crane runway, and welding speed may be varied from 4 to 80 in. per minute by changing the gantry travel speed. The gantry crane is easy to adjust, convenient to use and very flexible in its applications. Though originated by Cleveland Crane primarily for its own work, it has been adapted for use in other plants.

In building a welded girder, automatic welding is used to join the two webs in one operation to the girder's top flange. Diaphragms or stiffeners are manually welded to the top flange and then to the web plates. The flanges vary in thickness from $\frac{1}{2}$ to $1\frac{1}{8}$ in., and the webs are $\frac{5}{16}$ to $\frac{1}{2}$ in. plate. The diaphragms are usually of the same thickness as the webs. After all of the diaphragms have been properly placed, the webs are welded to the bottom flange automatically with $\frac{3}{8}$-in. fillet welds, using the welding gantry and making two passes per weld.

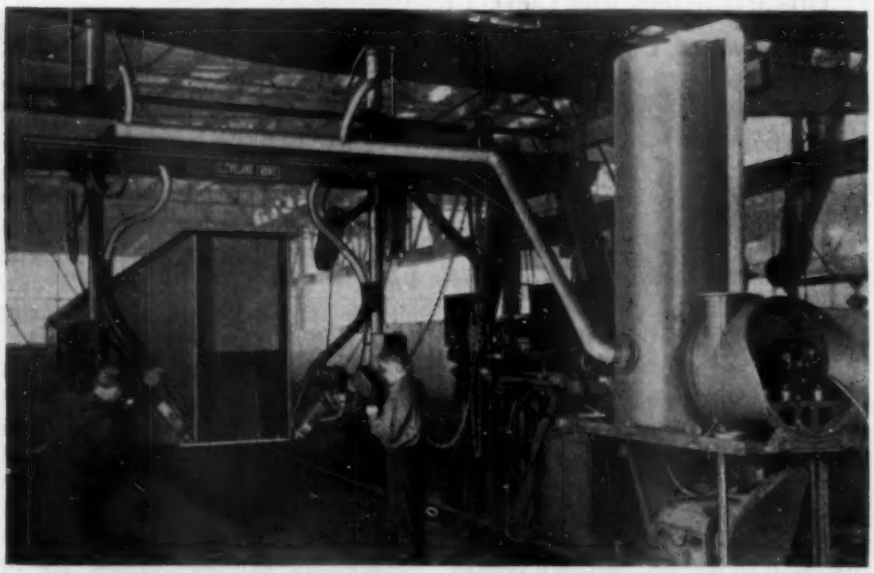


Fig. 2—Automatic welding gantry designed for use in Cleveland Crane structural shop. This picture shows a long crane girder being welded; the two web plates are welded to the bottom plate simultaneously and automatically

Disassembled for Shipment

The cranes are completely assembled before shipment to assure that fitting will be perfect throughout. They are then knocked down to the fewest pos-

sible pieces consistent with shipping limitations. Sometimes girders must be shipped in two sections and spliced together when erected.

Fig. 3 shows the special splice construction that was developed for girders of 30 heavy-duty cranes shipped recently to Brazil. The splice has a strength of 150% of a section through the middle of a similar girder without a splice. The cranes for which it was designed range in capacity from ten to 40 tons and have spans up to 103 ft. They were supplied to the new three-mile-long, $95,000,000 steel plant constructed at Volta Redonda Brazil, by the Companhia Siderurgica Nacional (National Steel Co.). When completed, this plant is expected to produce 300,000 tons of steel and 50,000 tons of pig iron annually—about half of Brazil's past annual requirements.

Tramrail Construction

Tramrail overhead trackage is used with hand-propelled or motor-driven carriers and electric hoists to do the lifting and lowering. The system is so flexible in its application that a list of users and potential users would read like a roster of American industry. Hundreds and perhaps thousands of miles of Tramrails are now in service in foundries, steel mills, glass plants, machinery factories, textile and paper mills, etc.

A typical Tramrail example is the bucket carrier shown in Fig. 4. This two-bucket unit was built for carrying sand but is suitable for many different kinds of bulk materials. Each bucket has a capacity of 25 cu ft, and the operator can empty either bucket or both of them together as he desires. Two motorized travel drives propel the cab and buckets on their aerial runways.

The arch-beam construction shown in this picture (Fig. 4) is a patented Cleveland Tramrail feature. The rails, made for long operating life, are of high-carbon steel having a Brinell hardness of 225. Each rail is joined to a wide-flanged upper section of low-carbon steel. The arch-type construction provides high compressive capacity and greater lateral stiffness. A more obvious advantage is the saving in weight.

Making Arch Beams

Arch beams are fabricated in depths of 8 to 18 in., depending on the strength desired. A standard I-beam is sheared in a die to produce two arch beams in one operation with a minimum of waste material. The rail is then welded to the arch beam, which must be done manually because of the intermittent welds necessary.

Rails and arch beams travel together via conveyor through a gauging machine, set for the size to be fabricated, to the welding station. Here two arc weldors, working one at each side, join the feet of the arches to the rail as the beam moves in continuous production. Use of a recently developed high-tensile electrode has rendered it unnecessary to preheat the two components.

All-Welded Bending Presses

Turning from cranes and overhead travel to heavy machinery, Steelweld presses are employed by various industries for bending, forming, punching, multiple punching, blanking, drawing and/or corrugating. They are versatile tools. Several operations may be performed by passing the work successively through various dies set in position along the bed of the machine. Tapered and conical shapes are

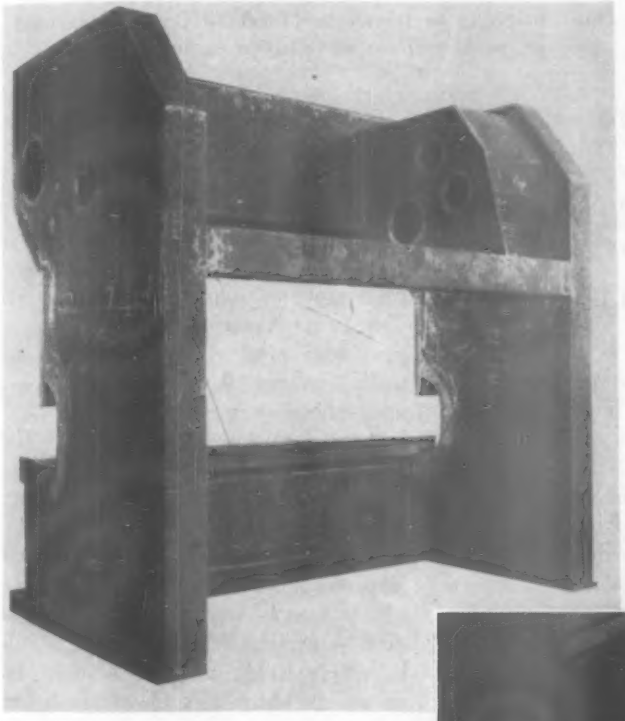


Fig. 5 (left)—A rear view of a bending press frame showing box-type end housings, base plate, bed, throat forgings and the large crown

Fig. 6 (below)—A frame for Model P6½-10 bending press. Welding is nearly finished, and the frame will shortly be machined as a rigid one-piece unit

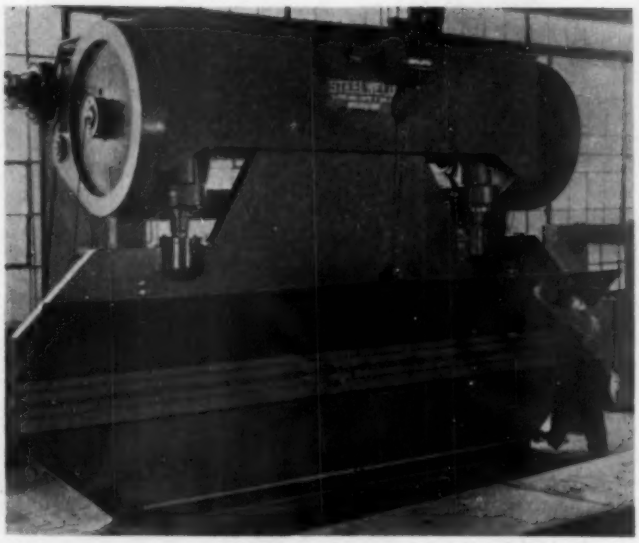


Fig. 7—Model L5½-16 press. It weighs 50 tons, bends cold steel plate up to 20 ft by 5/16 in. or 8 ft by ¾ in.

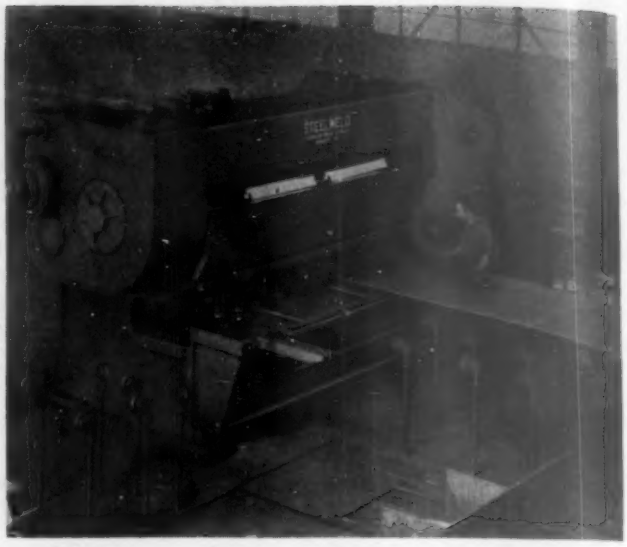


Fig. 9—Shear in service in Cleveland Crane's structural shop. It will cut plate up to ¾ in. by 10 ft

easily made by use of a ram-tapering mechanism.

The advantages of welding having been discovered many years previously in the building of Cleveland cranes, it was natural that welding should be decided upon as the major process in the fabrication of press frames. The welded construction permits the metal to be placed exactly where the greatest good is accomplished and vanquishes limitations inherent with other types of construction. Welding also makes it possible to fabricate the heavy frame so that all of its sections will be evenly stressed. For example, the throat sections in the two end housings are ordinarily the most vulnerable points in a bending press. In a Steelweld press, these are so reinforced that they are no more stressed than other sections of the frame.

Built-up End Housing

Each end housing is built up as a box section. The two plates forming the side walls of the housing are held parallel at a distance of 6 in. or so apart by welding in rod spacers at uniform intervals. The box is then completed by welding cover plates to the side walls and adding the bottom flange. The throats at each end are reinforced by welding in heavy steel C-shaped forgings.

Deflection at a Minimum

The end housings with their reinforced throats are joined to the base plate and to the large crown (Fig. 5). The heavy crown and end housings provide a most rigid support for the main bearings. Under full load, average deflection is not more than 0.001 in. per foot between housings. The box-type end housings also have great strength and resistance to twisting action.

Because of the large masses of metal involved and the dimensional accuracy which must be maintained, it is necessary to preheat frame sections to 350 F before welding. This is done by means of oil-burning preheating torches.

Bending capacities of Steelweld presses range up to 10 ft of ¾-in. plate or equivalent and lengths up to 22 ft. 0 in. Speeds range from 20 strokes per minute in the larger presses to 30 strokes per minute in the smaller models. A throat depth of 18 in. is standard, which means that bends may be made up to 18 in. from the edge of the plate for the full length of the dies.

Fig. 6 shows some of the welding work on the frame for a Model MO6-10 press. The welding is nearly finished, and the press will shortly be machined as a rigid one-piece unit. Thus accuracy is assured, and the possibility of misalignments eliminated. When this press is completed, it will bend cold a 10-ft plate ¾ in. thick. A Steelweld

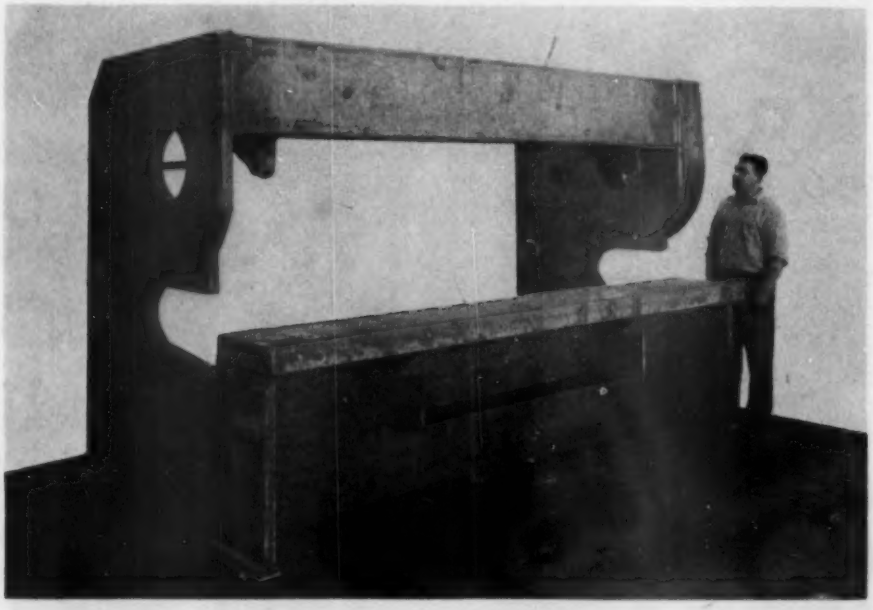


Fig. 8—Front of shear frame showing end housings, base plate, bed and crown

press in action is pictured in Fig. 7.

Power-driven shears for cutting heavy metal plates are the latest and a very recent addition to the Steelweld line. These shears are designed along a new pivoted-blade principle. Instead of moving up and down like a guillotine, the upper blade travels in a circular path and turns on pivot pins secured to the end housings. Thus there are no slides and guides to wear out of true, and the only wear to which the blade is subjected (other than the cutting edge) is the inconsequential wear at the pivot pin bearings.

Steelweld shears may be arranged for squaring, slitting or set at any intermediate position for notching. The shearing force is so applied that its horizontal component will approximately equal and counteract the pressure that tends to spring the knives apart during shearing. This feature reduces the load on the blade pivot pins to a negligible amount.

Like the frames of Steelweld presses, shear frames (Fig. 8) are of all-welded one-piece construction. There are some differences, however. Because of the greater stress imposed by shearing, the end housings must be made of solid steel plates. They are flame-shaped from heavy plate ranging from 1½ to 6 in. in thickness, depending on the size of shear. Holes for the throat and for the bearings of the blade-pivot mechanism are flame-cut as part of the shape-cutting operation. The base plate (stiffener) is welded between the two end housings, and the throats are reinforced with heavy steel forgings like those of the bending presses.

The bed of the shear is welded integral with the frame. This can be done because the knife adjustment is made by movement of the upper blade only, and there is no need of moving the bed. The crown is welded to the end housings, and the heavy scrap chute at the rear is welded to both end housings and to the bed.

No Slippage of Parts

This method of welding all parts of the assembly into an integral unit provides maximum strength with minimum deflection and assures permanent accuracy, company engineers say. There can be no slippage or movement of parts as can occur with bolted assemblies.

Shears are being manufactured in various sizes for cutting plate of any thickness from 12 gauge to 1¼ in. and for lengths of from 6 to 18 ft. An interesting feature of the machine is the ease with which the knife clearance may be changed to suit the thickness of the plate by merely turning the hand crank located on the right end housing. A large dial indicates the clearance in thousandths of an inch and also shows the plate thickness that may be cut with any knife setting.

Speeds range from 60 strokes per minute on the smaller shears to 25 strokes per minute on the largest size. Throat depths are 18 and 24 in., the latter being standard.

The shear shown in Fig. 9 is the one in service in the company's own structural shop. As earlier stated, it will cut plate up to ¾ in. by 10 ft.

Gears and Bulldozers

Steelweld "bulldozers" are horizontal-type bending presses used for forging operations and other heavy jobs where tremendous power is required. A typical model has a bending capacity of 300 tons and is used to hot work high-carbon-steel bars 2½ by 7½ in. in cross-section.

Like the bending brakes and shears, bulldozers have rigid one-piece all-welded frames. They are built to stand up under heavy loadings—no bulldozer frame has been known to break since the first one of these unique machines was built a dozen years ago.

One of the jobs for which bulldozers are used in the Cleveland Crane plant is to form the rims of large gears. Such gears as those shown in Fig. 10 are fabricated in three or more pieces. The hub and the web are of mild steel, and the rim is of high-carbon steel.

Rim Welding Procedure

The rim of the gear on the left of the picture was formed in two pieces. These were beveled so that the points of the vees would be on the outside. Thus a minimum of weld metal will be in the tooth when the gears are cut. The first vee was welded, joining the two formed sections of the rim together. The welding of the rim to the web was then begun, starting at the point just below the welded vee and laying beads alternately on both sides of the circle. The effect of this "balanced" welding was to concentrate the stresses toward the open vee, which was not filled in until practically all of the welding on the web had been completed. The final operation was to complete the seam joining the web to the rim.

Because of the difficulties inherent in the welding of high-carbon steel, the rim and the web must be preheated in an oil furnace at 350 F. The welding of the hub to the web presents no particular difficulties since both pieces are mild steel. The welded gear blanks are stress relieved prior to machining.

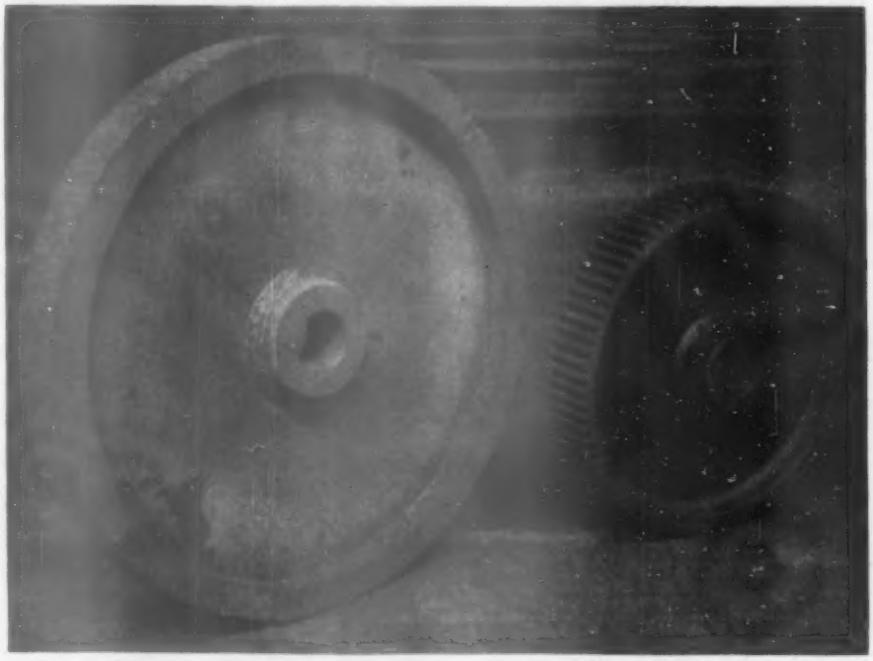


Fig. 10—Gear and gear blank fabricated by welding rims and hubs to webs

Procedures fo

"Digging in" to get good penetration works very well on steel, but it is *not* the way to add metal to cast iron. What will work on iron castings is told here.

Courtesy, C. E. Phillips & Co.

Fig. 1—This 500-lb iron casting had a large cavity to be filled by arc welding

THE SALVAGE of defective, worn or broken gray-iron castings presents a large variety of arc-welding applications. This does not mean, however, that every new job poses an entirely different problem. Long experience in the field of reclamation welding has shown that most castings can be quickly identified as belonging to a certain group and that the correct procedures for all jobs in a group differ only in certain details.

Jobs Requiring Build-up

One general classification includes castings which require certain areas to be built up with additional metal. Build-up jobs can be subdivided according as they require: (1) a restoration of lost metal as in a broken gear tooth, (2) the filling of a cavity as in a porous or defective casting, (3) the build-up of a surface which has been worn away or incorrectly machined or (4) the addition of new metal to accommodate a change in design.

An important common factor in all of these build-up operations is the need for avoiding hardness in (*a*) the deposited metal, (*b*) the line of fusion and (*c*) the heat-affected zone of the parent metal. Even when the correct electrode material has been used, many so-called failures have been reported. Investigation usually discloses that the failure is caused by lack of an effort to preserve the full machinability of the casting. In other words, the chief difficulty encountered has been the development of hard spots because of using an incorrect procedure.

When working with ordinary steel, the experienced arc weldor usually digs in to get good penetration and at the same time uses as large an electrode as the work will stand in order to reduce welding time. This arc-welding procedure will not produce machinable deposits on gray-iron castings because it overheats the metal and also allows the deposited metal to pick up impurities from the parent metal. The overheated metal is easily chilled, resulting in the formation of hard and non-machinable carbides.

Rule One: Avoid Chilling

A good welding operator working with any good material can usually avoid porosity and checking in the deposit. With gray cast iron, therefore, the thing he has to learn is to avoid chilling. A fully machinable deposit can be produced provided that he uses an electrode and procedure which make that result possible.

Fig. 1 illustrates a specific case in which it was necessary to watch the effect of the heat on the parent metal. The casting weighed about 500 lb, and the repair could be done in two different ways according to the position of the work. The dimensions of the casting and the location of the weld are shown in Fig. 2. An approximately semicircular notch, 3 in. long by 2 in. wide by 3/8 in. deep, had been milled alongside one of the machined ways. It was required to fill this notch while avoiding the development of hard spots which would make subsequent machining difficult.

The electrode used for this job was a fabricated non-ferrous rod having a nickel core wrapped in a sheath of thin copper strip and covered with a slag-shielding coating. This rod is especially designed for making machinable deposits on cast iron which will be of the same color as the casting.

Must Avoid Digging In

In this particular application, there are two sharp corners to watch—one around the top of the notch and another along the straight edge of the notch at the bottom. A weldor on steel would not hesitate to dig into these corners with his arc in order to get good penetration. With cast iron, this is all wrong. The most important point of procedure is to avoid digging into the corners because hard spots due to chilling are certain to result.

for Welding Gray Cast Iron

If this cavity were to be welded in the flat position, the correct procedure would be as follows:

(1) Start the first bead on the inside of the corner; *i.e.*, at the root of the angle. So as not to melt the edge, the starting point should be ⅛ or 3/16 in. away from it, and the deposit is carried around the root of the angle to within about ⅛ in. of the other end (see Fig. 3).

(2) Clean all slag from the first bead.

(3) Apply the second bead inside the first, as shown in Fig. 3, holding the arc on the first bead so that about 75% of the heat is applied to the previous deposit and only about 25% affects the parent metal. This procedure will avoid both porosity and hardness.

(4) Clean all slag from the second bead and continue welding until one layer of beads has been laid over the bottom of the cavity.

(5) The metal at the edge will now be warm enough to remove the danger of chilling, permitting the final bottom bead to be laid along the edge. Again hold the arc mostly on the deposited metal instead of allowing it to play on the sharp edge.

The second and other layers can be deposited with the same procedure. In the final bead, deposited around the top, the arc is held entirely on the previously deposited metal so that the new deposit is not allowed to flow over onto the parent metal. This final bead has an annealing effect on the parent metal near the edge and insures that the casting will machine perfectly.

The above procedure was not followed in the case illustrated because it would have taken longer to set the casting in position for flat welding than it would to weld it in the inclined position. A slightly different procedure was therefore followed in this particular job.

With the work in the inclined position, welding was started in the lower corner and ⅛ in. from the edge. The first bead was carried only part way around the arc of the cavity, and three additional beads of about the same length were deposited. Fig. 4 indicates at A the approximate length of these deposits, and Fig. 5 shows how the beads overlapped. The first bead formed a shoulder on which additional beads were deposited to build up slightly above the original level.

In each bead after the first, the arc was held largely on the previous deposit. Care was also taken to clean away the slag from each bead before depositing the next one.

When the cavity was about half filled, the edge was warmed sufficiently so that beads could be deposited without danger of chilling along the area indicated at B in Fig. 4. The upper half of the cavity (C) was filled in the same manner, finishing with a deposit along the edge at D. One final bead was then deposited around the edge of the cavity to provide plenty of material for machining. This can be seen in Fig. 1 as a narrow ridge running around the contour of the cavity.

Three Important Precautions

The precautions most necessary to the success of this procedure were:

(1) To clean out slag thoroughly between deposits
(2) To hold the arc mostly on the deposited metal
(3) To avoid letting the arc play on sharp corners

By following the procedure outlined, it was possible to make the repair without preheating, which might have warped the casting. No hard spots or porosities were encountered, and the job machined perfectly.

In conclusion, it might be pointed out that the procedure details given are based upon the known effects of heat on gray-iron castings and upon the necessity for keeping the work clean.

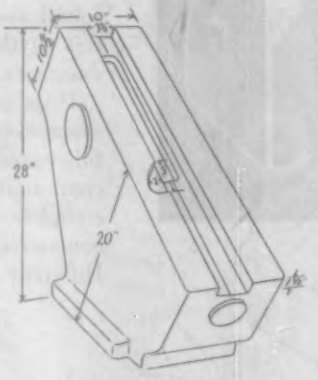


Fig. 2 — Principal dimensions of casting and cavity

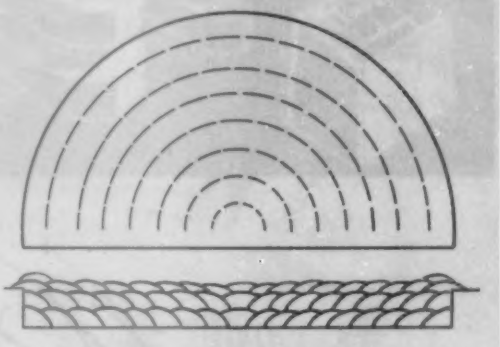


Fig. 3—Flat-position welding procedure

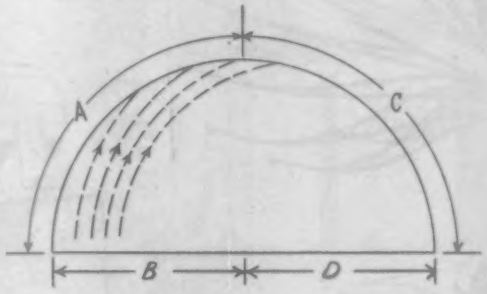


Fig. 4—Procedure that was actually followed for welding in an inclined position

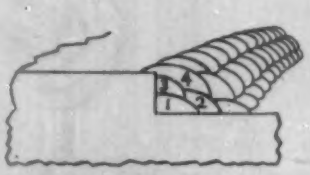


Fig. 5—Section of overlapping bead deposits showing how the breakdown of sharp corners was avoided

Shapes of

Designers of today can learn from these weird machines. If the future ever sees their like, they will be fabricated from readily available materials by use of welding and flame-cutting.

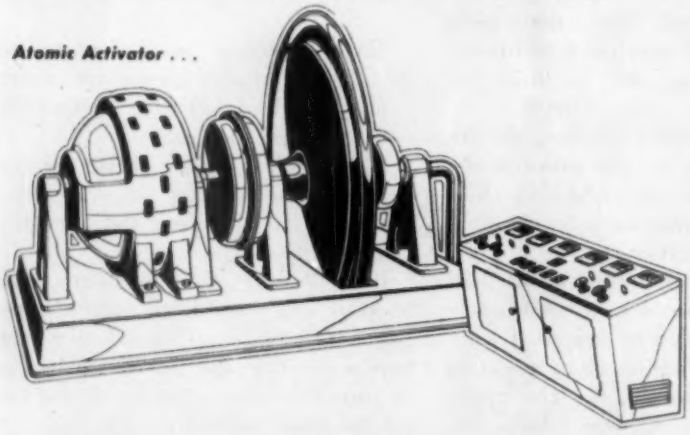
MODERN MACHINERY has a different appearance than the same kind of equipment designed twenty years ago. The advance of science has also brought about the design and building of machines which could not have been imagined, say even ten years ago. Remember that as short a while ago as 1941 the liberation of atomic energy was labeled utterly fantastic!

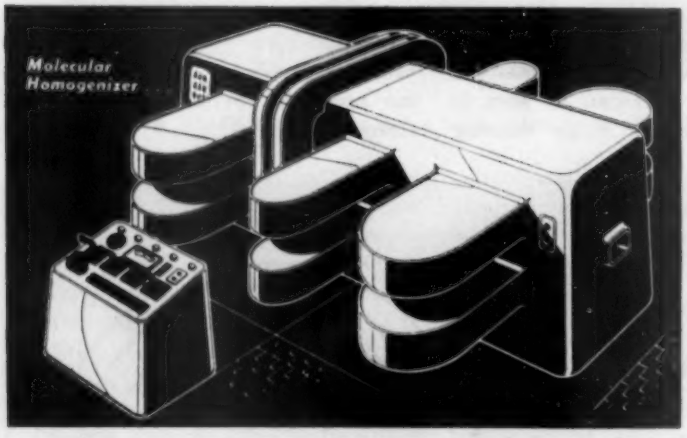
The weird gadgetry pictured here, reproduced through the courtesy of The Hobart Brothers Co., is the conception of Welding Consultant Robert E. Kinkead, the author of a three-volume "serious" textbook, *Practical Design for Arc Welding*. In drawing such hypothetical, non-existent and purely imaginary gadgets as a megosonic directoscope and an astomatic engine, Mr. Kinkead wasn't trying to go Buck Rogers one better, nor was he relaxing in the luxury of a private dream world. His reason for working with more or less abstract ideas will be found, he says, in the tendency of the human mind to reject unfamiliar forms as related to well-known objects. In his own words:

"A designer who has worked on steam turbines for years resents it furiously, and very properly, when someone who knows nothing of steam turbines offers a so-called 'modernistic' design which does not look like a turbine at all. In producing such machinery as the allohypathicator, the thought, which seems to me sound and fundamental, was that the ideas shown in this mythical structure might possibly be of use to designers in general."

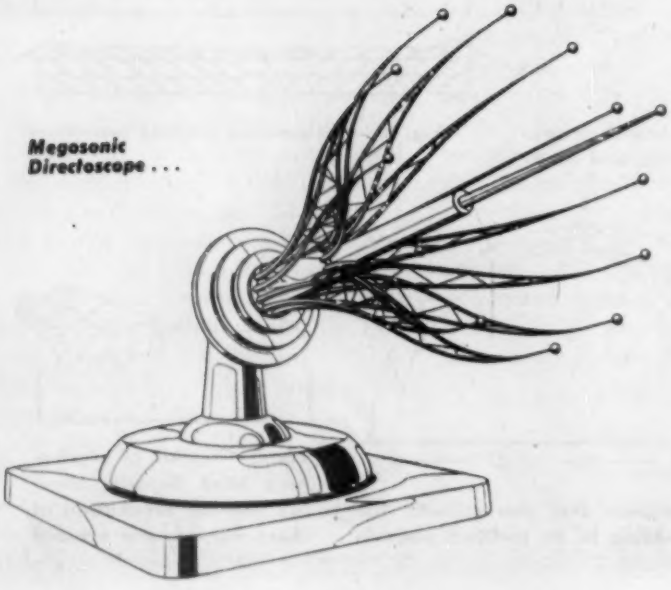
If the atomic activator and the electronic synchronoscope ever *are* born, they will, thinks Mr. Kinkead, be fabricated by welding and flame-cutting, for no other combination of processes permits the designer such complete freedom of choice. He can use any metal commercially available in any thickness and any form. Different metals may be combined in the same struc-

Atomic Activator . . .

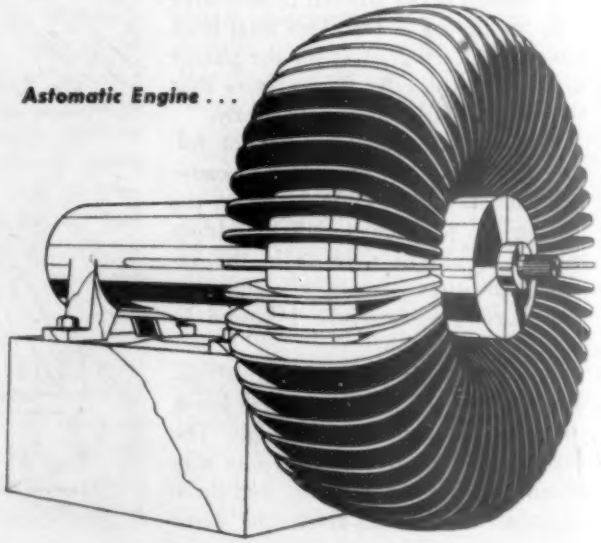




Megosonic Directoscope . . .



Astomatic Engine . . .



Of Things to Come

ture, and the design may be changed as often as necessary without loss of pattern costs. Finally, additional strength and rigidity can be added without scrapping the structure already built. Bearing these points in mind, let us see what lessons can be learned from the eight machines pictured:

Atomic Activator: Using special dies and flanging presses, structures like this one become simple to fabricate by welding.

Molecular Homogenizer: Notable economies and good appearance have been combined through the use of relatively light covers. Welded sheet metal also gives a dustproof housing.

Megosonic Directoscope: Straight rod may be tapered by forging. A jig for holding the components makes this complicated structure not-too-difficult to fabricate by welding.

Astomatic Engine: Using common materials and welded construction, apparatus involving fins or other extended surfaces for heat transfer may be designed almost without limitation.

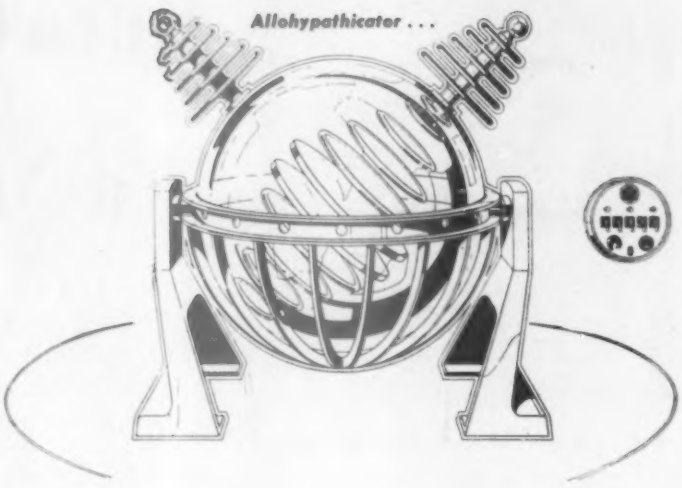
Electronic Synchronoscope: The designer in welded steel is free to use exactly the right amount of metal where needed. This is the correct method of weight reduction.

Allohypathicator: Practically any metal available in sheet or plate form may be used to build this unusual structure. Structural shapes which cannot be rolled may be fabricated by welding.

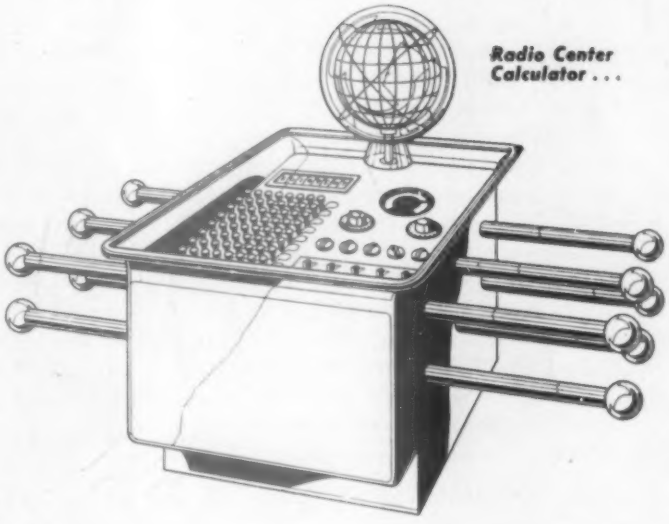
Radio Center Calculator: Practically any requirement of line, form or function may be met by use of universally available sheet metal, plate or tubing.

Devalencing Still: Processing equipment is designed from a purely functional point of view. The equipment illustrated could be built in any well equipped pressure-vessel fabricating shop.

Allohypathicator . . .

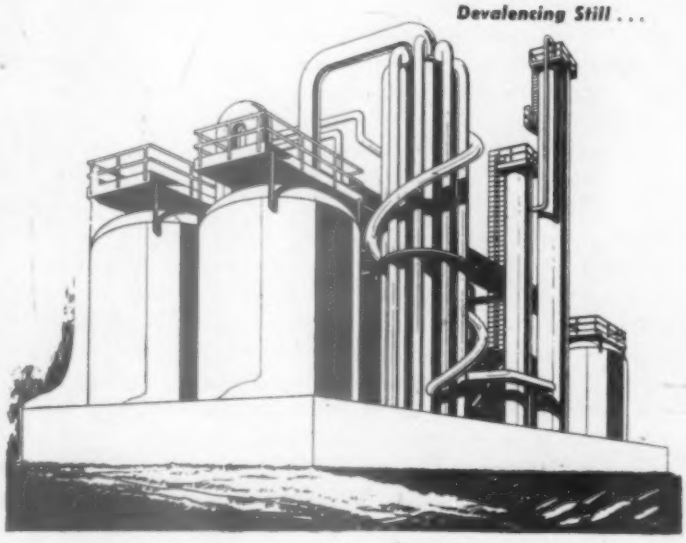


Radio Center Calculator . . .



Electronic Synchronoscope . . .

Devalencing Still . . .



★ OPERATION

Metal-Spinning— a New Flame Process

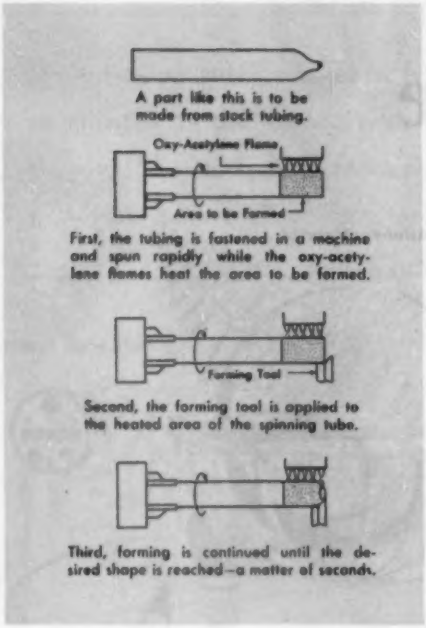

A part like this is to be made from stock tubing.
Oxy-Acetylene Flame
Area to be Formed
First, the tubing is fastened in a machine and spun rapidly while the oxy-acetylene flames heat the area to be formed.
Forming Tool
Second, the forming tool is applied to the heated area of the spinning tube.
Third, forming is continued until the desired shape is reached—a matter of seconds.

Fig. 1—Fundamentals of flame-spinning

PROBABLY the idea of forming articles by spinning was first used by the primitive potters who shaped their plastic clay on revolving potters' wheels. By rotating the "wheel" and pressing his hand or finger against the spinning lump of clay, the potter learned through the prehistoric centuries that he could produce an amazingly wide variety of various circular shapes. The method finally came to be adapted to the shaping of metal articles from tubular stock. Metal fabricators have used the spinning method for many years, but until the exigencies of war made a faster process necessary the spinning was always done cold.

Add Oxy-Acetylene Flame

The age-old principle of spinning has now been coupled with the use of the oxy-acetylene flame to heat and soften the work to be formed. This has led to the development of a new but already popular method of shaping metals—the oxy-acetylene flame-spinning process.

Developed by wartime necessity, the flame-spinning process has become an essential and permanent method for shaping tubes and tubular products. Offering as it does the advantages of economy and speed, it is gradually displacing slower cold-forming methods throughout industry. The flame-spinning method can be used in many cases where cold forming is impossible because of the large size or heavy wall thickness of the tube to be formed.

Flame-spinning is employed in some instances to eliminate joints in tubular members. Its other uses include partial or complete closures of tube ends and the reduction of diameters at any point.

The part of the tube which is to be shaped is heated with an oxy-acetylene flame or flames. During the heating, the tube is rotated rapidly. As the forming temperature is reached—within a few seconds after the flames are first applied to the work—a tool is forced against the heated end to shape it to the desired form. Basically, that is about all there is to flame-spinning. The flames usually continue to heat the work during shaping in order to keep it pliable. When the forming is completed, the spinning is stopped and a completely shaped tube is removed.

How the Process Works

Full details of the process are given in the diagram (Fig. 1) and the three photographs, all reproduced through the courtesy of The Linde Air Products Co.

A variation is the so-called "bomb spinning" in which the work is brought to plastic temperature in a furnace and the oxy-acteylene flames are used only during forming. The furnace process is generally reserved for the shaping of large, heavy tubing—say tubing of more than 4-in. OD or $\frac{3}{16}$-in. wall thickness.

Flame-spinning is now being used on tubing ranging from $\frac{1}{2}$ to 4 in. in diameter, but there appears to be no reason why tubing of much greater diameter could not be spun. The only limiting factor is that the ratio of tube diameter to wall thickness should not be greater than about 50 to 1. Experience has shown that tubes having a greater diameter-thickness ratio tend to deform under the forces involved in the spinning operation.

Mechanical Equipment

A flame-spinning layout requires a lathe or similar heavy-base machine incorporating the following features: (1) a rotary member with chuck; (2) forming tools and support; (3) oxy-acetylene heating heads and control equipment; (4) a timer.

A heating head with seven flames suffices for many applications, but 17-flame and 30-flame heating heads are available for larger areas. The number of flames in each head can be varied to suit special needs by replacing the tips of the unnecessary flames with blanks.

Forming tools are generally of a roller, cam or flat-plate design, depending on the nature of the forming job. They are usually surfaced with a heat-and-wear-resistant alloy, such as a cobalt-chromium-tungsten alloy, to improve wearing qualities under high-temperature work.

For spinning standard tubing up to about 2 in. OD, a motor of approximately 3 hp is required to supply the rotative power; for tubes of 3 to 4 in. OD, about 10 hp is needed.

Spinning Converter Tubes

The use of flame-spinning in a typical production job—the fabrication of closed tubes for chemical converters—is illustrated in Figs. 2, 3 and 4. The tubes were cut to size from 3-in., 12-gauge mild-steel tube stock and closed at one end. The complete forming operation took only 35 seconds per tube—a fraction of the time needed in the

One of the oldest methods of forming materials—the spinning process—develops into one of the newest methods of metal-forming.

cold-forming method previously employed.

A rhomboid heating head having 30 orifices was used, though actually only nine orifices were needed to do the job. The forming tool is of flat-plate design. When the tube end was sufficiently heated for forming, the flame head was raised, automatically shutting off the heating flame. The closing of the end was then begun.

To effect a complete closure, a secondary heating was applied at the tube edge just before the end was sealed. The latter heating served to prevent impurities and gas pockets from being trapped in the center where the metal is fused together. A strong, solid end section was thus formed.

The tubes were tested at a pressure of 1,000 psi, a figure well above the working pressure. Test specimens showed that the wall at the closed end of the tube was actually thicker and stronger than the side walls. Etched specimens revealed a very satisfactory crystalline structure in the worked area.

In War and Peace

The flame-spinning process is naturally adapted to mass-production methods. It has been and is being used to good advantage in plants producing items for the automotive, chemical, refrigerating, air-conditioning and other industries using tubular parts.

In wartime, flame-spun parts were made for flame throwers, chemical bombs, bomb fuses and hand grenades. Peacetime applications include gas cylinders, shock absorbers, refrigerating-unit members and other shaped tubular parts.

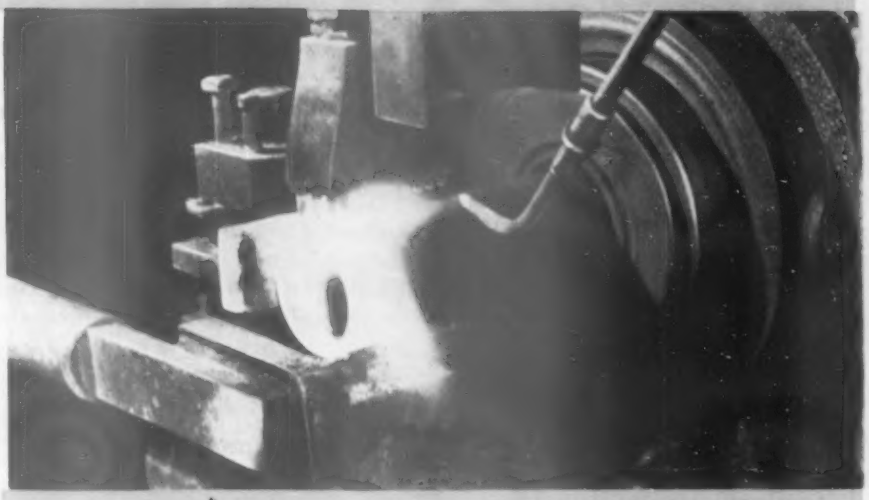


Fig. 2—Work being flame-spun reaches red heat quickly under the oxy-acetylene flames. The forming tool is at the left, and a pilot light at right

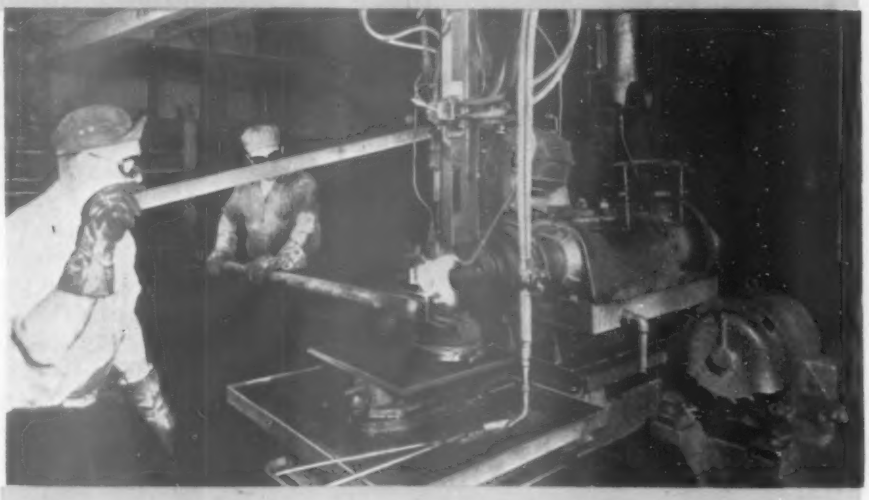


Fig. 3—Overall view of the flame-spinning set-up pictured in Fig. 2, for the closure of tubing for chemical converters. The heating operation shown above is the first step in the end closure. There is also a secondary heating

Fig. 4—When the work has reached forming heat, the flames are withdrawn, and the shaping tool is forced against the work. Here the tube is three quarters closed. Secondary heating is applied just before the end is sealed

★ PRODUCTION

Butt Welder for Joining Strip Steel

The installation of a strip steel butt welder in the pickling line of a cold rolling mill makes the continuous production of strip steel virtually an accomplished fact.

THE DIFFICULTY of joining strip as it leaves the hot rolling mill has heretofore prevented steel mills from realizing many advantages of continuous operation, particularly as it applies to production at the pickling line. Now the process of flash-butt welding has come to the rescue.

In producing cold-rolled strip, it is standard practice to take coils of stock that are reduced from slabs or billets in the hot rolling mill and put them through additional processes in order to bring the strip down to specified size and to give it the necessary physical characteristics for best results in drawing, forming or other converting operations.

Uniform Pickling Necessary

It has been realized for some time that a method of performing these operations without interruption would result in increased production, eliminate waste and make it possible to exercise much closer control over the various finishing operations. During pickling, for example, the steel is passed through a series of vats containing acid and wash water to remove surface scale and to show up imperfections. It is necessary to keep the stock moving at uniform speed so that the entire strip will be pickled to the same degree. This can best be done with a continuous strip.

The hitch in the past has been the lack of a satisfactory method of joining the hot-rolled sheets. Various methods were tried such as lapping the ends of coils and stitching or punching them together or butting the ends by arc or gas welding. If one of these methods succeeded in getting the strip through the pickling vats without breaking, it usually produced joints that would not go through the reducing rolls or, in any event, had to be cut out of the strip before delivery because they possessed properties that did not conform.

Makes Indiscernible Joints

The new strip steel butt welder, which was built by Thomson-Gibb Electric Welding Co. in coöperation with the Mesta Machine Co., eliminates all of these disadvantages. It joins the ends permanently so that the welded joint will stand fully as much tension or bending as the rest of the strip, and it forms a joint with all the physical properties of the parent stock. Once the welded sections have passed through the reduction rolls, the joint becomes practically indiscernible. It takes a finish exactly like the rest of the coil and behaves in exactly the same way during drawing or shaping operations.

A typical pickling-line installation includes reels for uncoiling the stock received from the hot mill, an up-cut shear for squaring the ends of the strip, the welding unit, a pull shear for removing the burr and a looping pit. When a coil in process begins to run out, enough stock is fed into the looping pit to provide a reserve that will last while a new coil is being joined to the end of the old one.

Operating Procedure

The ends of both coils are trimmed square in the up-cut shear, lined up in the welder by gauges and joined in a butt weld. The welded strip moves into the pull shear, where the burr is removed from the top and underside, and then passes through the looping pit and into the pickling vats. Since all of this is done before the slack in the looping pit is used up, there is no need to change the speed of the strip as it moves through the pickling solution.

With the development of this practical method of joining strip, steel mills are no longer forced to limit the length of the coils to the amount that can be rolled from a single billet. Manufacturers whose converting processes would benefit by coils of greater lengths than have formerly been available can now have them in many cases as long or as large as their storage or handling equipment will accommodate. Furthermore, every inch of the strip will be uniform in both quality and finish.

This specially designed flash-butt welder joins the coils of stock hot rolled from individual billets into a continuous strip for the pickling vats

PAGE *Welding* ELECTRODES

The PAGE formula for Production Welding Economy

C+X=S
WHERE:
C= COMPLETE RANGE OF ELECTRODES AND GAS WELDING RODS
X= EXPERIENCED FIELD SERVICE MEN TO RECOMMEND CORRECT RODS AND TECHNIQUES
S= SAVINGS IN WELDING COSTS

The high quality and uniformity of Page electrodes and rods are taken for granted by experienced welders. Production welding economy is a matter of (1) selection of the right rod and (2) welding "know-how." Both are offered by PAGE. For electrodes or gas rods and for information about their most economical use, get in touch with your PAGE distributor.

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P&H

"SM"

FOR SHEET METAL WELDING

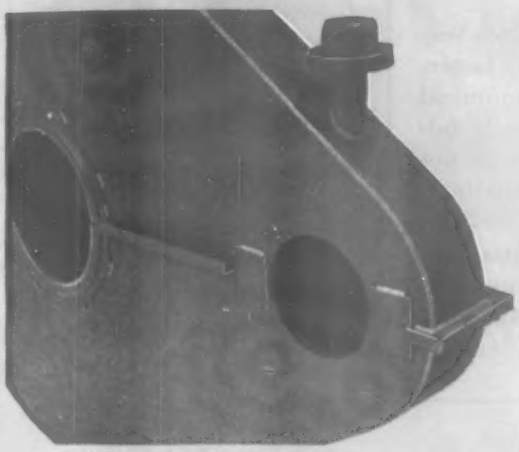
CLASS AWS-ASTM E-6013

"SM" is the new P & H electrode — spray type — for welding sheet metals. Applying it may be likened to "brushing on" weld metal.

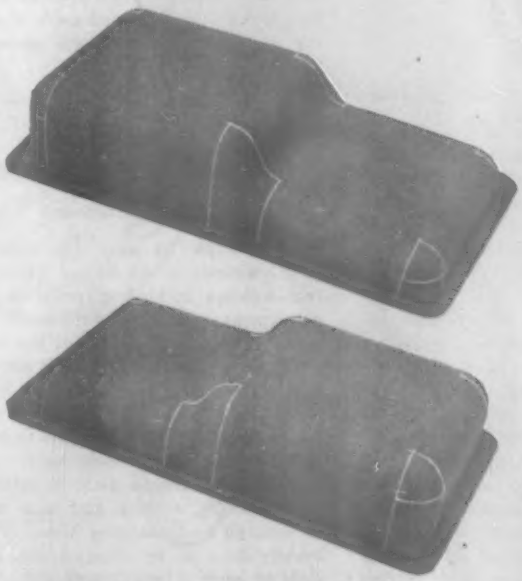
"SM" reduces material spoilage. Its lower heat requirements eliminate the hazard of "burn-throughs" and "suck-ins". Removing slag is easier, chipping isn't necessary. The weld deposit is smoother and flatter, grinding operations are eliminated. "SM" is much easier to use — to produce the cleaner, stronger, more uniform welds. It cuts costs to the bone.

"SM" is a typical example of P & H welding research and development. Thoroughly tested and proved, it's the newest addition to America's most complete line of electrodes and arc welding equipment. Try "SM" on your work.

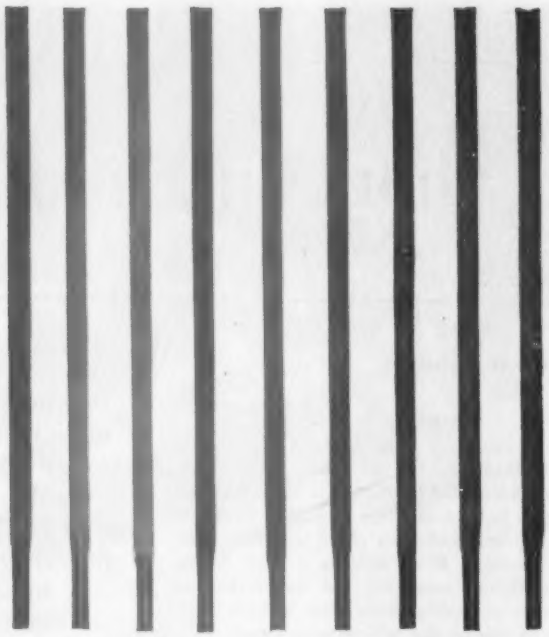
use "SM" for all light gauge welding



This gear case of 12-gauge steel was tacked and welded throughout with "SM." Note the clean, flat beads which save expensive grinding and finishing. "SM" can improve the strength and appearance of your products—and save you money!



When welding such products as these oil pans of 16-gauge sheet metal, "SM" gives lower penetration—speeds up welding. "SM" is the perfect electrode for the fabrication of trailer and automobile bodies, tanks, heating equipment, vents or grills, farm machinery, metal lockers, galvanized sheet, etc.



AW-2B	AW-4	CM-50	DH-2	FW	AC-3	PF	AC-1	AP
AWS E-10020	AWS E-10012	AWS E-7011	AWS E-6020	AWS E-6020	AWS E-6013	AWS E-6012	AWS E-6011	AWS E-6010

call on P&H for all electrode requirements

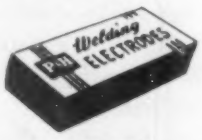
There is a P & H Electrode in the correct type and size for all mild steel applications as well as for welding stainless and alloy steels and for hard surfacing. Above are shown a few of the complete mild steel group.

CONVINCE YOURSELF TRY P & H "SM"

AMERICA'S MOST COMPLETE ARC WELDING SERVICE

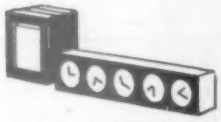
DC WELDERS

AC WELDERS



WELDING ELECTRODES

WELDING POSITIONERS



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Short Cuts and Kinks

Do you know of a better way to do it—a way that is faster, easier or more economical than the method usually followed? If you do, why not pass it along? Send anything you think suitable for this section to: Short Cuts and Kinks, The Welding Engineer, 520 North Michigan Ave., Chicago 11.

Thermit Igniter

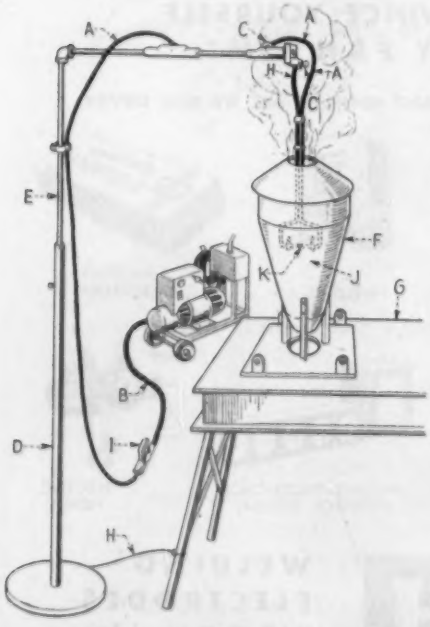
By Ed Shepherd

IT IS quite a job to ignite a crucible of thermit. At the Kaiser Co., Inc., Vancouver yard, for instance, it was common practice to heat one end of a long steel rod with a torch and then place it in the thermit crucible. When welding a stern frame, the workman using the rod was forced to jump or scramble down from a high platform to dodge the hot-spewing metal.

To avoid this unsafe operation, I suggested to our Labor-Management Committee the use of an electrical device which I had designed specifically for thermit welding. My suggestion included an igniting arc between two pieces of carbon. One of the carbons was attached to a cable to a welding machine and the other to a cable to ground.

The carbon-arc unit was placed in the thermit crucible while cold. The wires leading to the arc were supported by a pipe bracket that would keep them out of the way and so minimize the amount of wire burned by the sudden thermit reaction.

When every one was in the clear, the current was turned on by starting the welding machine, and the thermit was ignited instantly. This method, while only slightly faster than the older way, was a good deal safer. It removed the hazard of having a workman in the range of the thermit crucible and the extra risk of jumping clear of the platform after ignition.



This device uses current furnished by an arc welder to ignite a thermit crucible. A-live wire; B- current from machine; C- valve or set screw to hold wire; D- 1-in. OD pipe; E- ¾-in. pipe; F- crucible; G- jig; H- ground wire to jig; I- electrode holder to contact live wire A; J- thermit; K- carbon electrodes

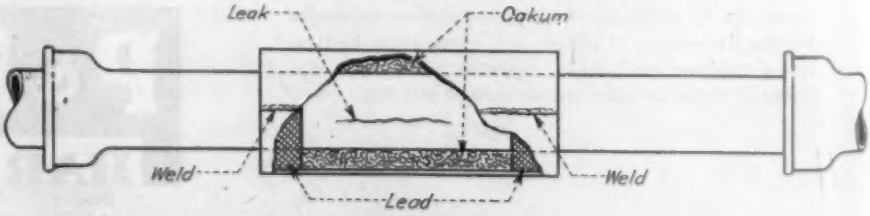
☆ ☆

Water Pipe Repair

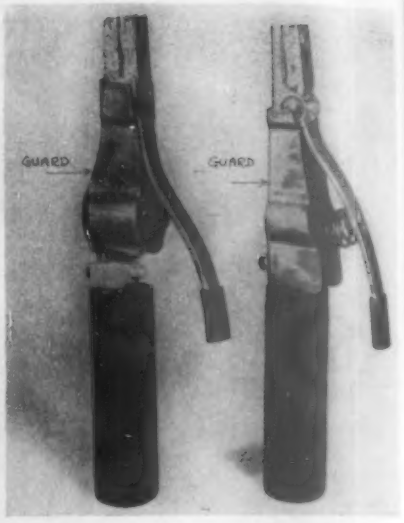
By George Holman

WELDING isn't ordinarily used as a means of repairing a broken cast-iron water pipe, but it will prove its value when a water main bursts, and no sections of pipe of the proper size are available. On several occasions, I have had to make repairs under these conditions, and this is the way I accomplished them:

First, a short piece of larger pipe salvaged from the scrap pile was split and welded together about the broken pipe as shown in the accompanying sketch. Welding was completed at a point to one side of the leak, in order to minimize the time of service interruptions. The water was then turned off, and the welded section shoved over the leaky area. The annular space between the two pipes was packed with oakum, and the repair was completed by pouring molten lead into the ends and further caulking.



Sketch showing the method of effecting a quick welded repair to a burst cast-iron water main



Guards for two different types of electrode holders. They protect the springs and cables

Electrode-Holder Guards

By C. J. Smith

THE SPRINGS of electrode holders and the cables running to the holders are frequently burned by weld spatter. This could be overcome, I thought, by attaching a simple guard to each holder.

The suggestion was adopted by the Labor-Management Committee at Parish Press Steel Co., Reading, Pa., and guards such as those shown in the accompanying illustration were made. It has been estimated that the use of such a guard more than doubles the life of the holder parts as well as the life of the holder itself.

☆ ☆

Neat Tacks Save Chipping

By Clarence N. Cannady

I SUGGESTED to the Labor-Management Committee at the Kaiser Vancouver yard that weldors tacking material in place for subsequent welding should make the tack whatever size is specified for the finish weld —$\frac{3}{16}$, $\frac{1}{4}$, $\frac{5}{16}$ in. or whatever it may be. Also the tack should be at least 3 in. long.

Tacking seams on flat plates should be left flush as any convexity has to be chipped out for a submerged-melt weld.

Neat tacks always mean a better looking job of finish welding and may save hours of welding and chipping time. Poor tacks usually have to be chipped out, for if you weld or cover a tack it makes a bad looking job and you don't get penetration.

Yep! HOT HEADED

600 every hour

Another use for a spot welder.

The production rate on this potato masher explains why production men use spot welders for fabricating boxes, panels, frames, grill work, wire products, kitchen ware, automotive parts, radio cases, agricultural tools . . . in fact almost any product requiring the joining of metal.

One man operating one Taylor-Winfield Spot Welder at Merit Products Co., Niles, Ohio, completes 600 potato mashers every hour. That's 10 strong, sturdy mashers every minute.

Picture now your own product and visualize what 2, 5, 10, 15, or 50 men or women can do with an equal number of Taylor-Winfield Spot Welders.

Get the full production story of spot or the other forms of resistance welding (seam, flash-butt, and projection) ***from a Taylor-Winfield representative . . . available through letter or phone call.*** He'll help you put the joining of metals on a low-cost, production basis.

The operator joins a solid ¼" steel rod to a die-stamped, cold-rolled steel plate by "hot-heading" on a Taylor-Winfield "C" type Spot Welder . . . at the rate of 10 every minute. Produced by Merit Products Co., Niles, Ohio.

Taylor-Winfield Spot Welders are used for the welding of clean and coated carbon steels, stainless steels, and weldable alloys of aluminum, nickel, copper, and magnesium. Available in foot, air, or motor operated types in many models and sizes. Shown—"C" type, foot-operated.

The TAYLOR-WINFIELD CORPORATION

WARREN . . . OHIO

On the Job

These all-welded gas holders were erected at Volta Redonda, Brazil, for the Brazilian National Steel Co. Their construction required approximately 5,300,000 lb of steel

Gas Holders for Brazil

SHOWN at the top, left, are the first all-welded gas holders built in South America. These were erected at Volta Redonda, Brazil, for the Brazilian National Steel Co. by the Stacey Brothers Gas Construction Co., Cincinnati. The holder on the left has 1,000,000 cu ft capacity and is used for "bubble" on the line, while the other is of 5,000,000 cu ft and is used for the storage of blast furnace gas. Approximately 5,300,000 lb of steel were used in the construction of these big holders. Field operations were executed by Brazilians.

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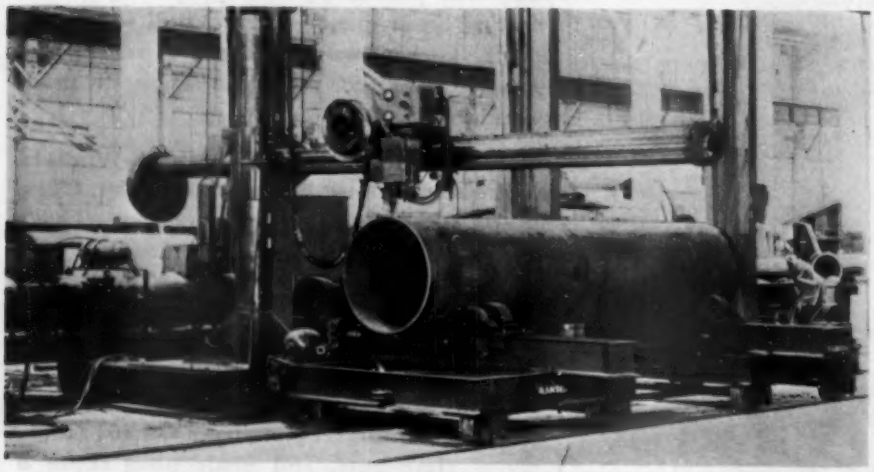


Courtesy, Ransome Machinery Co.

With the automatic welding head in a fixed position, the pressure vessel can be rotated for circumferential welds or driven forward for longitudinal seams by merely shifting a clutch

Welding Pressure Vessels

SELF-PROPELLED turning rolls mounted on a track (center picture) are used by the Struthers Wells Corp., Warren, Pa., for stepped-up automatic welding production on tanks and cylindrical objects of various lengths and diameters. The automatic head is held in a fixed position. On circumferential welds, the weldment is set on the turning rolls and rotated. On longitudinal welds, the work is driven along the track at the desired welding speed. The same rolls can be used for both operations.

☆ ☆

Agricultural Versatility

THE USES of welding on the farm are limited only by the farmer's equipment and ingenuity. When the bearing for the distributor shaft of the manure spreader cracked, one farmer (bottom picture) trailed over his new 200-amp, gasoline-engine-driven welder and rejoined the broken part in 20 minutes by arc welding, using a $\frac{3}{16}$-in., all-position mild-steel electrode.

☆ ☆

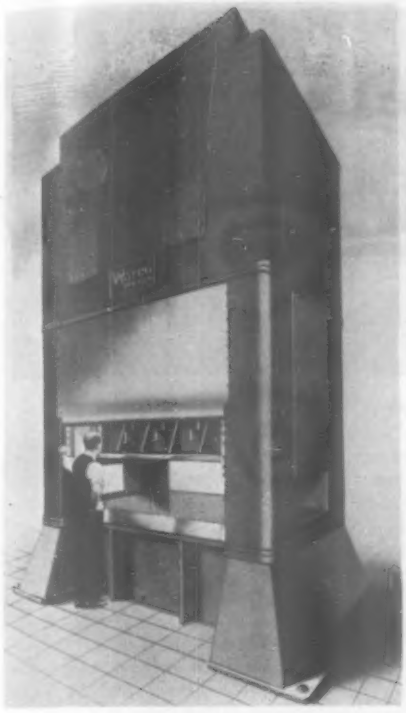
Courtesy, The Lincoln Electric Co.

The farmer and his hired man—a 200-amp gasoline-engine-driven arc welder. The broken part is the bearing for the distributor shaft of a manure spreader

Welded Steel Presses

PRESENT plans at the Warren City Mfg. Co. (see News, page 86) are to build a complete line of mechanical open-back inclinable presses ranging in size from 50 to 150 tons capacity, a series of mechanical and hydraulic metal-working presses with capacities of from 100 to 1,200 tons and mechanical press brakes in sizes from 100 to 500 tons and designed to handle lengths up to 24 ft. All of these new "Warco" presses will be of welded steel design, which has made it possible to include special features for special applications.

The press frame of eccentric gear models will be of welded steel to provide the rigidity essential to maximum die life. These large weldments will be stress relieved to prevent locked-up stresses and future misalignment. The slide will also be of welded steel and



A "Warco" two-point eccentric gear press of welded steel construction. These presses are being built in a capacity range from 100 to 1,200 tons, stroke range of eight to 36 inches.

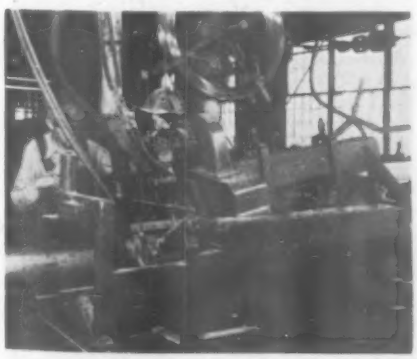
will be guided in long gibways lined with bronze. Similar frame construction will be used on the other types of presses.

The quarter-mile-long factory at Warren, O., built and equipped by the U. S. Navy in 1942, has 225,000 sq ft of floor space fitted with the most modern equipment for fabrication, welding, machining and assembly of heavy work. There are 251 manual and automatic arc welders, 44 welding positioners, three furnaces to relieve welding stresses and three sets of rolls, three press brakes and two flanging presses to form the plates.

☆ ☆

Automatically Welded Pipe

A STEEL fabricator mounted a submerged-melt welding head on a continuous tube mill in order to weld the longitudinal seams of large-diameter piping. The rolled sheet forms are fed into one end of the mill and come out at the other end cleanly welded and ready for painting.



Courtesy, The Linde Air Products Co.

Welding 12-gauge pipe at a speed of 70 in. per minute with an automatic welding head

Repair
BROKEN PARTS
Quickly WITH
TITAN MANGANESE BRONZE WELDING RODS

TITAN Manganese Bronze Welding Rods melt at a low temperature and possess excellent tinning properties . . . therefore a minimum of preheating is necessary when repairing gear teeth, stripped threads, and other broken parts. Furthermore, they flow in an even layer over cast iron, steel, malleable iron, etc., even where grease and rust cannot be removed prior to welding. Repairs are made quickly, efficiently, and your equipment is put into production with minimum delay.

In common with our other rods, TITAN Manganese Bronze Welding Rods are double deoxidized to effectively remove gases and prevent the formation of harmful oxides. Regardless of what you weld there is a TITAN bronze welding rod to serve your needs. *Write for literature.*

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More Welding in Texas

By Ervin Hickman

H. G. WENDLAND, owner of the Wendland Sheet Metal & Mfg. Co., San Angelo, Texas, doesn't think that there is going to be any slackening of the postwar demand for welded products for at least a long, long time. The firm now occupies 2,100 sq ft of floor space, but it is planning a new plant site which will have 15,000 sq ft of space. When the company began operations 25 years ago, it had only 1,200 sq ft.

Wendland war contracts included the building of 12,000-gallon gasoline storage tanks, pressure vessels for hot-water storage, generator tanks, smoke stacks and breechings. The larger contracts called for 500-gallon and 750-gallon skid tanks for water for overseas shipments and salt-water distillation tanks for the U. S. Maritime Commission.

This busy scene is typical of the work at Wendland Sheet Metal & Manufacturing, San Angelo, Tex.

The present line of work consists of butane transports, skid tanks for oil-well drilling rigs, domestic butane or propane systems and other heavy equipment. Mr. Wendland is also contemplating the building of large steel trailers.

The shop's equipment now includes ten arc welders, a power brake, plate shears and rolls for forming ½-in. plate.

☆ ☆

Fine Wires Bench Welded

WELDING of spiderweb delicacy is being successfully accomplished at the Warren, Pa., plant of Sylvania Electric Products, Inc., by means of electronically controlled bench-welding equipment. Welds of multisection wire products made of tungsten, copper-clad steel, copper, nickel and copper and nickel alloys are mass-produced in sections ranging from 0.0005 to 0.1280 in. in diameter. These welds are suitable for the leads, pins and mounts used in incandescent and fluorescent lamps as well as for electronic tubes, evacuated and gas-filled switches and special, hermetically sealed electrical devices. Tungsten, nickel or copper-clad wire products may be welded to as many as four other metals per section.

All of these wire sections are resistance welded to assure good electrical and mechanical properties.

It can be done! Some of these welded wires include as many as five different metals

4 FEATURE

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1 Thousands of twisted wires properly shaped provide extra-flexibility. Less tiring to handle.

2 Tough construction offers greater resistance to abrasion, oil and water. Less time out for repair.

3 Bright copper wires of hair width sizes provide high conductivity. Steadier power on the job.

4 Heavy live rubber jacket and tape wrapping protect wires. Prevents "shorts" and breakdowns.

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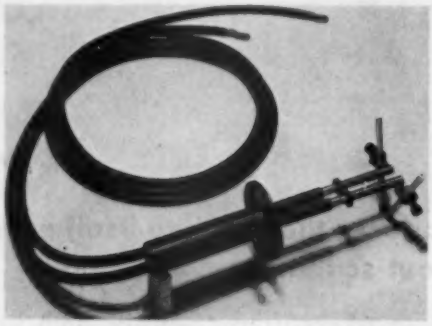
New Products to Use

"Twin Thermatorch"

A NEW carbon-arc torch has been designed for heating, cutting and welding applications on all a-c and d-c arc welders. The torch can be used for welding aluminum, white metal, brass and copper and for brazing and hard-facing.



"Twin Thermatorch" for carbon-arc welding, brazing and cutting jobs with a-c or d-c welders

A trigger switch located on the handle allows the operator to start, adjust, and break the arc with a flip of the finger. An arc is established the instant the two carbons come into contact, and the proper arc length may be maintained by adjusting the oscillating carbon. Three sizes of carbon—¼, ⅜ and ⅜ in.—are used with settings of 20-40, 40-70 and 70-100 amp. PLYMOUTH EQUIPMENT & SUPPLY CO., P. O. Box No. 358, Plymouth, Mich.

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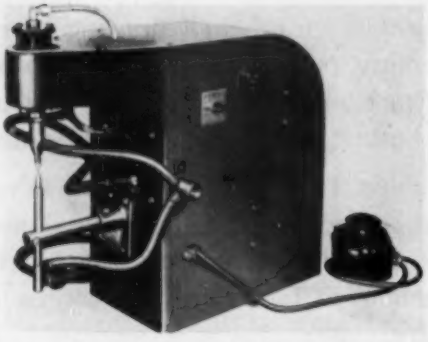


Weldex bench welder. It can be used to spot weld lightweight metals up to 18 gauge

Bench Welder

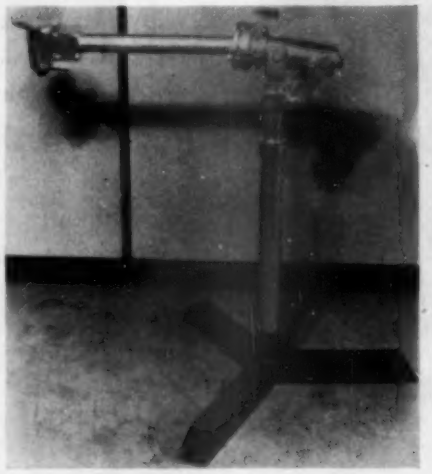
WELDEX model 263-A is recommended for the spot welding of lightweight metals; *i. e.*, metals up to 18 gauge CRS or equivalent. This new machine is a 3-kva, 220-volt, 60-cycle, single-phase, air-operated, foot-controlled precision welder. It is equipped with an electronic timer and an adjustable pressure switch.

This new bench-type spot welder measures 21 in. high, 10 in. wide, 23 in. deep and weighs approximately 135 lb. WELDEX INC., 7339 McDonald Ave., Detroit 10.

☆ ☆

Balanced Positioner

THE "Universal" balanced positioner is readily adaptable to almost any fixture required to hold assemblies while welding, being limited only to weight. It will handle 200 lb or less with complete ease by the movement of a finger. The axis about which the arm revolves can be leveled on at any angle with controlled friction. When in position, it is locked with a quick turn of a knob. The various positions can be indexed readily by drilling a shallow hole in the periphery on which the set screws bear.



Universal balanced positioner. It will hold work at any angle convenient to the weldor

The unit is adjusted to balance with a sensitivity up to ½ lb variation. The principle of adjustment is that the two axes of rotation are made to intersect and pass through the center of gravity of the work. ARONSON MACHINERY CO., Arcadia, N. Y.

☆ ☆

Safety Goggle

AN improved all-plastic safety goggle is now made with a molded plastic frame that resists breakage and is said to provide better ventilation and reduce fogging. The new frame is comfortable for wear directly over many styles of prescription glasses and gives protection against injury from top, sides and bottom. The lens is made of a tough impax methacrylate plastic that stops flying chips, splinters and hot metal particles. It exceeds Federal specifications for impact-resisting goggles, manufacturer claims.

Watchemoket model 1-N plastic safety goggles protect the eyes against flying particles

WATCHEMOKET OPTICAL CO., INC., Providence 3, R. I.

☆ ☆

Shape-Cutting Machine

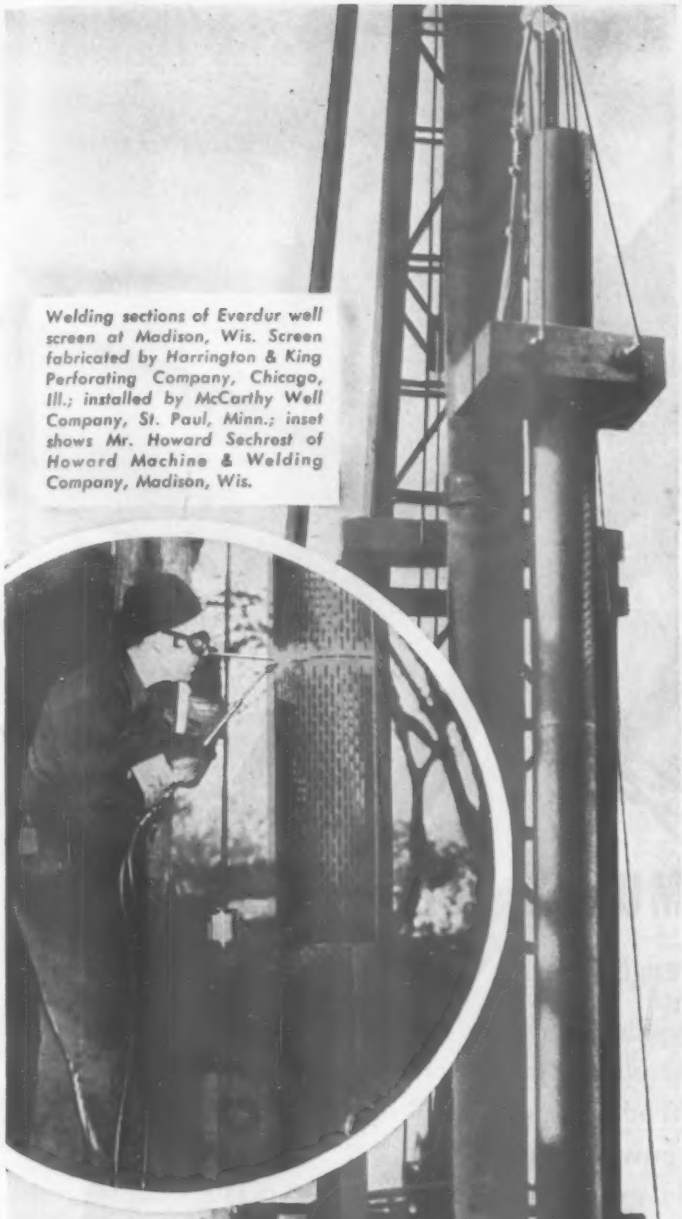
THE first postwar model of an Oxweld oxy-acetylene shape-cutting machine, the CM-15-36, has been designed to do precision cutting on work of intermediate size, which formerly could be done only with a large machine. An attachment is available that makes it possible to cut identical shapes simultaneously from plates on both sides of the tracing table. This attachment consists of supplementary torch holders, mounting bracket and bar. It can be used to a great advantage in eliminating down time, states manufacturer, since plates can be put into position on one side of the machine while cutting is being done on the other.

The machine has a transverse working range of 36 in. The longitudinal working range with the standard table is 100 in., but this range can be extended indefinitely by adding frame and table top sections.

Two freely moving arms mounted on the lightweight cast aluminum carriage give torch motion in any direction within the limits of the work area. The torch holder may be tilted to an angle of 45 deg from the vertical to permit making bevel cuts. A flat one-piece aluminum plate, 42 in. wide by 144 in. long, is supported on the frame between the rails of the track to serve as a table to hold the drawing or template. The tracing head is powered by a 110-volt universal motor. An eddy-current-type speed governor gives a continuous variation of speed from 3½ to 28 in. per minute.

The machine as shipped is equipped for either mechanical tracing with strip template or hand-tracing. Straight-line cutting guides and a circle-cutting attachment for circles 1½ in. to 36 in. in diameter are also supplied with the machine. A magnetic tracing unit is available as an accessory. THE LINDE AIR PRODUCTS CO., 32 East 42nd St., New York City 17.

The new Oxweld shape-cutting machine, CM-15-36, at work cutting gusset plates



Welding sections of Everdur well screen at Madison, Wis. Screen fabricated by Harrington & King Perforating Company, Chicago, Ill.; installed by McCarthy Well Company, St. Paul, Minn.; inset shows Mr. Howard Sechrest of Howard Machine & Welding Company, Madison, Wis.

TWENTY *Everdur* Sections welded end-to-end . . . form 270-ft. Well Screen

THE ACCOMPANYING PHOTOGRAPHS show installation of an Everdur* screen in one of the wells operated by the Water Department of the city of Madison, Wisconsin.

In this installation, twenty tubular sections, 12″ diameter, made of ⅛″ thick Everdur sheet were welded together with Everdur Welding Rod to form one continuous 270-ft. length. Held in position by a special jig, each section was tacked to the next one below, and the jig removed for completion of welding.

In addition to the above, Everdur Metal is widely used for sewage, chemical, petroleum and other types of equipment because its high strength, corrosion resistance and weldability permit durable, lightweight construction. 48107

*Reg. U. S. Pat. Off.

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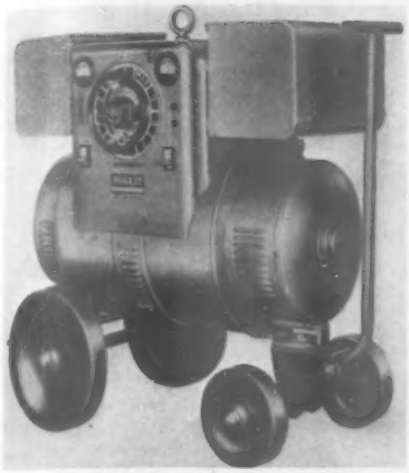


Battery charger-welder combination. It serves the dual purpose of charging or welding

Battery Charger-Welder

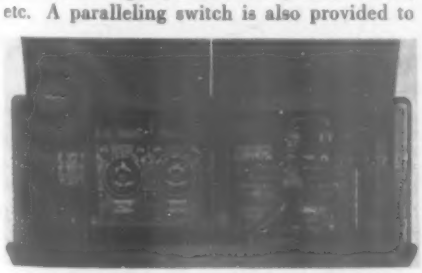
A BATTERY charger-arc welder combination has been developed for the dual purpose of charging railway coach batteries and electric arc welding. It has separate control panels with individual instruments for battery and welding circuits. A switch makes it easy to change from charging to welding or vice versa.

There are two models of this combination. Model No. 496 is a 300-amp electric-motor-driven welder including motor-generator control panel circuit for charging one railway coach battery at a maximum rate of 200 amp at 50 volts, d-c. Model No. 497 is of 400-amp capacity and includes control panel circuits for charging two railway coach batteries at one time and at a maximum rate per battery of 150 amp at 50 volts, d-c. HOBART BROTHERS Co., Hobart Square, Troy, O.

☆ ☆

Engine-Driven Welder

IN a new two-operator, gasoline-engine-driven Hobart arc welder, two 300-amp generators are placed on a common shaft and supplied with a separate excitation from a common exciter. This double unit is directly connected to an eight-cylinder Chrysler industrial engine. The engine is governed to maintain constant speed for all loads, allowing the two operators to work independently of each other. Because welding is inherently an intermittent load, two units can be connected to one engine to give a higher overall economy, thus reducing idle running time of the engine, service time, maintenance, etc. A paralleling switch is also provided to



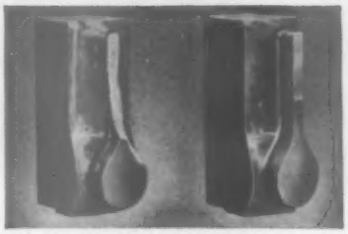
Two-operator gasoline-engine-driven welder. It may be used as a single or double unit

turn the unit effectively into a single-operator, 600-amp welder. HOBART BROTHERS Co., Hobart Square, Troy, O.

The Pioneers of Tool and Die

WELDING ELECTRODES

Can Effect Savings in Your Plant!



Die Unit repaired with Eureka Tool and Die Welding Electrodes. No heat treatment required.

Compositely Constructed Die Unit using Eureka Tool and Die Welding Electrodes. No heat treatment required.

You can save many man hours, conserve material and minimize production delays. Tool steel welding can be used profitably in any plant using tools and dies. Here's how it can be done:

1 REPAIRING DIES . . . Existing units that may fail in operation can be welded, either partially or wholly, resulting in a minimum of "down-time".

2 COMPOSITE FABRICATING . . . Die units can be compositely fabricated, when practical, by welding, resulting in numerous advantages.

3 CORRECTING DESIGN . . . Welding facilitates making changes in contour, corners or edges during die "try out" or "change over" periods.

4 RECTIFYING ERRORS . . . Welding permits the correction of errors made in tool and die manufacturing resulting in great savings.

For complete information write for technical catalog

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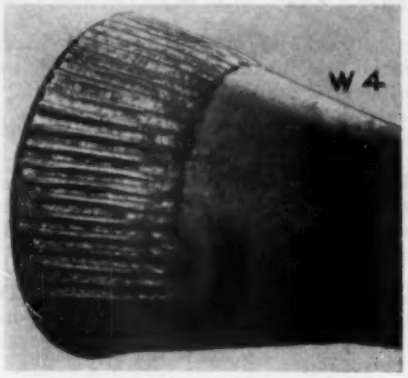
Crushing Costs Reduced by Conservation Welding . . . . .

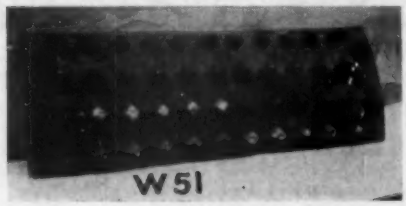
Wear is inseparable from the operation of crushing equipment, and an important factor in operating costs. For many years, the wearing parts subjected to impacts and abrasion have been made of austenitic manganese steel for the longest original life, but even "the toughest steel known," wears down in time in this brutal service.

Costs have been substantially reduced by the reclamation of crusher and pulverizer wearing parts with



Amsco Welding Products, which are so tough and durable that salvaged parts often last longer than the original castings.

W-4 shows a rehabilitated manganese steel 128" crusher mantle. Amsco Nickel-Manganese Steel Filler Bars were swaged by hand to produce the proper contour, and then tacked onto the mantle, using Amsco Nickel-Manganese Steel Electrodes. All the



welds were peened thoroughly. The total cost was $275.00, and the user subsequently reported that the rebuilt mantle lasted as long as a new one.

W-51 is a roll crusher segment used in a coal preparation plant. The rebuilding job is in progress on this segment; one where the worn teeth have been built up repeatedly to their original height with Amsco Nickel-Manganese Steel Welding Rod and then surfaced with Economy Hardface. The Economy welded cap is hammered to a point while the weld metal is still hot.

W-12 compares two manganese steel pulverizer hammers worn down from crushing rock. The hammer on the left has been built up with Amsco Nickel-Manganese Steel Electrodes, after which Economy Hardface was applied to the surface of the weld metal.

In cases where drastic attrition more than heavy shocks is the destructive force, it is economical to hardface new manganese steel castings.

Write for complete details on Amsco Welding Products.

(Amsco Welding Products are produced and sold in Canada by Canadian Ramapo Iron Works, Inc., Niagara Falls, Ontario.)

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Induction-Heating Unit

"ILLITRON" induction-heating equipment may be used for brazing, soldering, surface-hardening, forging and annealing operations. Equipped with commercial oscillator and rectifier tables, all units are built for continuous operation at their power output ratings. A "rematching" feature automatically compensates for changes and thus provides the maximum power transfer to the work. This means that higher temperatures can be reached in shorter time, states manufacturer.

A single continuous power input control covers the useful working range, and there is also an automatic timer for second and minute control of the operation. Illitron units are offered in ratings of 1, 2.5, 5, 10, 20, and 50 kw, for operation on either 220 or 440-volt, 60-cycle, three phase-power lines. Power factor is about 95%. ELECTRONICS DIVISION, ILLINOIS TOOL WORKS, 2501 No. Keeler Ave., Chicago 39, Ill.

"Illitron" 2.5-kw electronic induction heater

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File for Tip Dressing

A CURVED-TOOTH file built on a new principle of design is offered for the dressing of spot-welding tips. It may be used on any flat or convex metal surfaces. Two types of teeth, roughing and finishing, on the same side of the file permit the rapid removal of stock with a smooth finish. The latter is accomplished by adding a slight right-to-left motion to the regular filing stroke.

The curved teeth are cut in arcs that are off-center from the axis of the file. Starting with wide gullets and a short angle for roughing, the teeth become longer and closer together until they end with narrow spacing and a long shearing angle to produce the finishing effect. NICHOLSON FILE CO., Providence, R. I.

"Super-shear" file. It is especially suited to the dressing of spot-welding electrode tips

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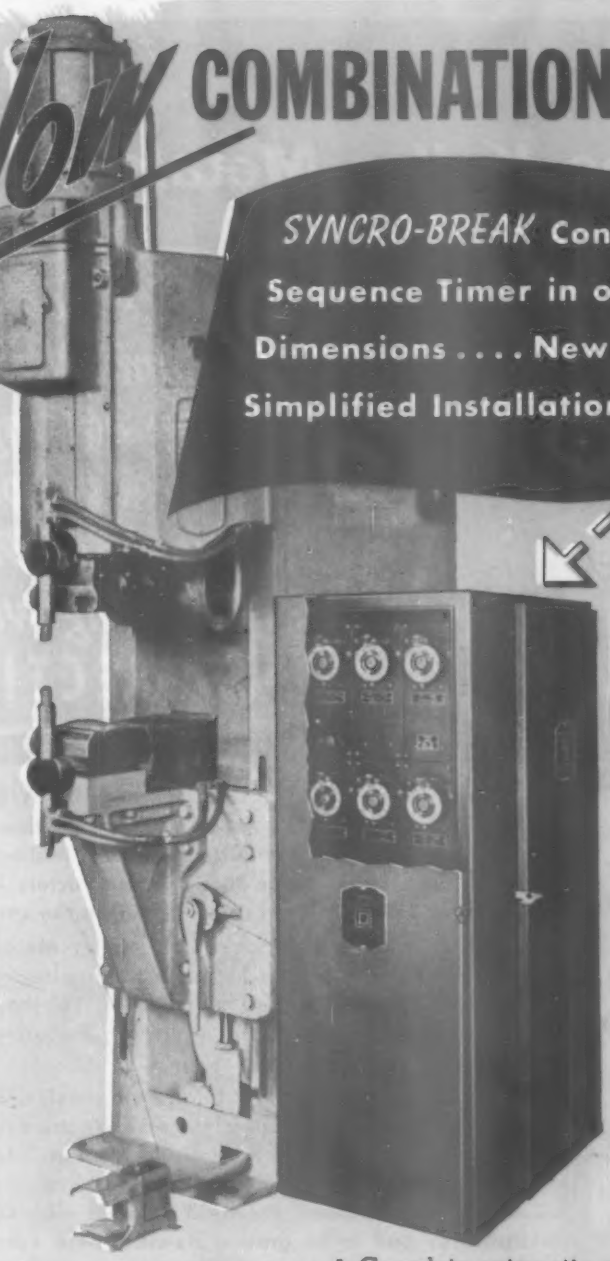
SYNCRO-BREAK Contactor and *Safront* Weld Sequence Timer in one enclosure .... Standardized Dimensions .... New Safety Features .... Greatly Simplified Installation .... Improved Appearance



1. Complete automatic control system in one cabinet—necessary control fuses, terminals, transformers, etc. included.
2. Specifically designed to meet new standards and recommendations of RWMA and machinery builders.
3. Front location puts dials within easy reach to facilitate machine set-up or time adjustments.
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6. Panel space provided for low voltage control or two-position foot switch auxiliaries.

Safront panel swung out to show timing and sequencing relays. Adjusting dials are on front of this panel for maximum safety. Separable connector strip allows easy removal of panel for installation or maintenance.

Side door gives access to contactor, control fuses, and all line, load, and control terminals. *SYNCRO-BREAK* rheostat is mounted on extended bracket to bring adjusting knob out beyond live parts.

for complete information, **write Square D Company, 4041 N. Richards Street, Milwaukee 12, Wisconsin**

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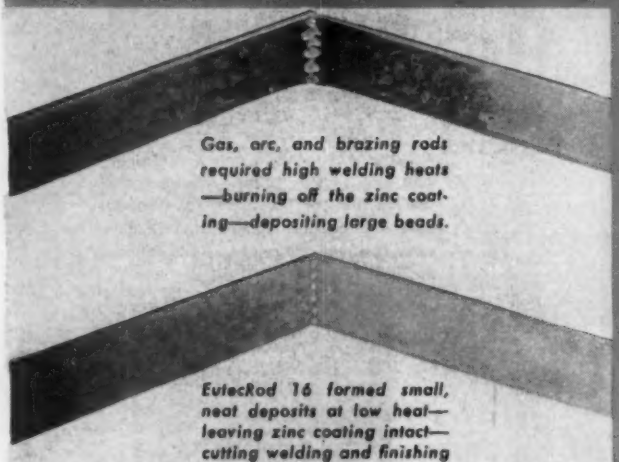

Gas, arc, and brazing rods required high welding heats —burning off the zinc coating—depositing large beads.

EutecRod 16 formed small, neat deposits at low heat— leaving zinc coating intact— cutting welding and finishing time 800%.

WHAT IS EUTECTIC?

EUTECTIC *Low Temperature* WELDING RODS* *are a new type of welding alloys which—*
1. Bond to base metals well below the base metal melting point. 2. Form exceedingly strong joints through surface alloying. 3. Give faster, better bonds at lower cost. 4. Avoid the dangers of stress and distortion characteristic of fusion welding and brazing.

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Please send me complete information on how to purchase a trial selection of 9 EutecRods for everyday use; also facts on EUTECTIC *Low Temperature* WELDING RODS and Fluxes. Dept. *

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Everyday EUTECTIC *Low Temperature* WELDING RODS* are proving to be the best in production welding. Hundreds of manufacturers are finding their many advantages to be the deciding factors in bidding low on important jobs and getting the contracts.

Here is a typical report from Keller Metals, Inc. This company bid on a big air-conditioning contract and *got it!* With the use of EutecRod 16, they were able to cut production time and manufacturing costs to the bone.

"The job called for welding large panels and trays made of 18 gage galvanized iron. We tried several different rods, but the high welding heats required, oxidized the zinc coating, necessitating recoating after welding. In addition, the weld deposits were so large that they had to be ground down. These additional operations required too much time and made the cost of fabrication prohibitive.

"Then we tried EutecRod 16, applied with the oxyacetylene torch. With its use, we cut production time for one unit from 30 minutes to 5 minutes. The low heat of application did not affect the zinc coating. Also, small, neat fillets were obtained without grinding.

"With EutecRod 16, we obtained a sound, leakproof construction of high strength and smooth appearance at low cost, and we got the contract."

For Your Welding Problems—Call* EUTECTIC *First

140 Field Engineers, in all principal cities of the United States and Canada, to serve you.

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*Trade-mark Reg. U. S. Pat. Off.

Sheet-Metal Gauge

A NEW type of instrument gauge introduced by The Glenn L. Martin Co. may be used to measure the thickness of sheet-metal stock and for inspection of the bonds between the layers of laminated materials. Operating on the pressure principle, it consists of an inverted cup-shaped shell having a top wall of transparent material and a bottom rim edged with a rubber gasket. Mounted inside the shell is a dial indicator equipped with a stem reaching to a spherically shaped foot. The dial measures thousandths of an inch as the foot is pushed upwards. The valve in the top of the case is connected to an exterior pump so that the air inside the gauge can be evacuated to any desired degree.

To use the gauge, it is placed on the area to be inspected, the valve is opened and the air inside the instrument is allowed to reach normal atmospheric pressure. A "standard" reading is then taken, and the air is evacuated for the second reading. Should there be a faulty bond (or no bond) between the surface sheet and the adjacent layers, this "loose" sheet area will pull away from the other layers against the foot of the gauge, and the resulting deflection will be detected on the dial.

The gauge can be calibrated to measure the thickness of a single sheet. This makes it a valuable supplement to micrometers, which cannot be used to measure central areas of large sheets. THE GLENN L. MARTIN Co., Baltimore 3, Md.

Glenn Martin sheet-metal gauge operates on vacuum principle to measure metal thickness

☆ ☆

Multiple Welding Gun

THE coördinated production of both right and left hand automobile fenders at 150 units per hour was simplified for a leading manufacturer of auto bodies through the use of a duplex gun-welding machine designed and built by Progressive Welder Co. The machine has two individual welding positions: one for left and one for right hand fenders. Each side has its own welding transformer, current distribution switch, timing circuit and contactor. One hydraulic power unit furnishes welding and clamping pressure to both sides.

Three types of welding guns are incorporated in the machine: a standard direct-action type, a bell-crank type to provide the greater clearance required at several points for easy loading of the parts and a floating type. The latter gun is mounted on the main table to provide the extreme clearance required to clear the major flanges of the assembly. The integral loading fixtures are provided with adjustable positioning arms for accurately locating the headlamp mounts over a wide range of fender lengths. PROGRESSIVE WELDER Co., 3050 East Outer Drive, Detroit 12.

Dual spot-welding gun designed to simultaneously weld left and right hand car fenders

Remote Control

AN almost miniature hydraulic remote control has been developed for use with throttles, governors and all sorts of position indicator controls. The bronze transmitter and receiver together weigh under 4 lb. Installation is accomplished with three small bolts for each of the two pieces which make up the complete unit. Any motion of the transmitter will be duplicated by the receiver arm, and the receiver arm may be drilled at any location to obtain the desired linear travel of the actuating rod. The transmitter and receiver may be joined by as much as 35 ft of connecting tubing without experiencing any difficulty, manufacturer states. SPERRY PRODUCTS, INC., Hoboken, N. J.

yes... MARQUETTE
REGISTERED U.S. PAT. OFFICE
has the LATEST DESIGN FEATURES

- INSTANT ARC STRIKING
- BUILT-IN CAPACITOR
- TELNIC BRONZE *Plugs and Sockets*
- HIGH POWER FACTOR
- NO "MAGNETIC BLOW"
- WIDE RANGE 20-275 amps.

Marquette's newly designed transformer gives INSTANT Arc Striking *without* extra high frequency or booster gadgets. Model 262 C has a wide range of 20 to 275 amperes and takes all welding jobs in stride from Maintenance to High Speed Production . . . from light gauge sheet metal to heavy steel beams. New Telnic Bronze plugs and sockets doubles current carrying capacity. Transformer efficiency is increased by the generous use of aluminum. Models: 262 and 262 C, 20-275 amps.; 261 and 261 C, 20-200 amps.

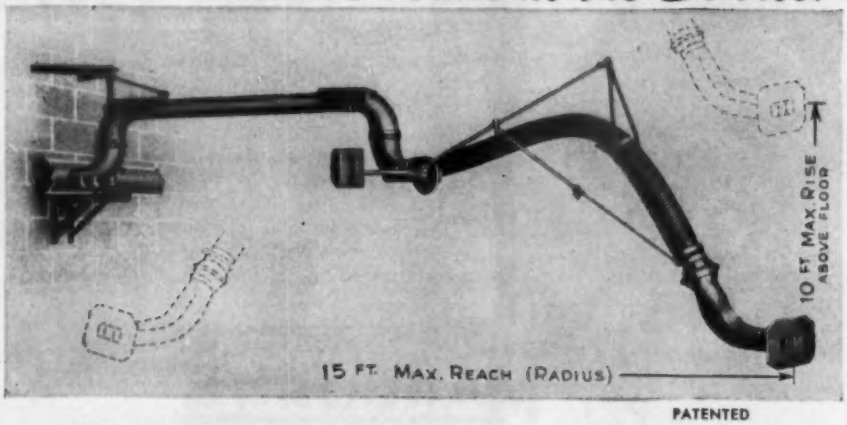
LOOK TO MARQUETTE FOR LEADERSHIP

MARQUETTE WELDING EQUIPMENT SOLD EXCLUSIVELY THRU THE NATION'S LEADING DISTRIBUTORS

MARQUETTE
REGISTERED U.S. PAT. OFFICE
Welding EQUIPMENT
A.C. ARC WELDERS · ELECTRODES
GAS WELDING And CUTTING EQUIPMENT
ACETYLENE GENERATORS · ACCESSORIES
MARQUETTE MFG. CO. INC.
MINNEAPOLIS 14, MINN.

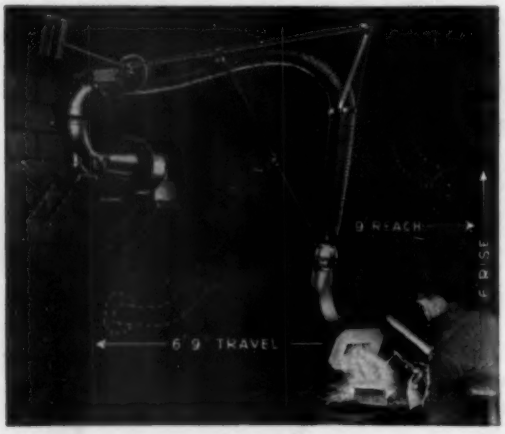
RUEMELIN Fume Collector

REMOVES WELDING FUMES *at the Source!*



PATENTED

LONG REACH MODEL D-5342 — Ideal for large welding booths. Hood reaches out 15 feet from wall. Swivel joints permit inlet hood to revolve in 360° circle for access to all welding positions. Recommended for welding shops having a wide variety of work.



STANDARD MODEL D-5310

Used for standard welding booth ventilation. Hood reaches out 9 feet from wall. A real necessity, especially during winter months when doors and windows are closed.

PATENTED

● Install Ruemelin Fume Collectors to solve your fume removal problem in the most satisfactory manner. Noxious gases, smoke and fumes are drawn away *at the source.* Check these exclusive features:

1. **Guards employee's health against fumes — less welder fatigue.**
2. **Clears shop air with minimum building heat loss.**
3. **Exhaust hood instantly positioned, without using troublesome devices.**
4. **Hood covers maximum welding area, vertically, horizontally and by circle swing.**
5. **Hood equipped with swivelling ball-joint.**
6. **Small amount of electric power used.**

Thousands in daily service in progressive welding shops, metal working plants, railroad repair shops, foundries, structural steel plants, etc. Repeat orders received from many satisfied users. Collectors are available with individual exhaust fans, or with one large fan for multiple collector installations. Engineering data and directions for installing, furnished with each order. Write for Bulletin 37-C and prices.

RUEMELIN MFG. CO.

3880 NORTH PALMER STREET MILWAUKEE 12, WISCONSIN, U. S. A.

MANUFACTURERS AND ENGINEERS

SAND BLAST AND DUST COLLECTING EQUIPMENT

A 4931-2/3

Stainless Steel Electrodes

"STAINWELD A 7" and "Stainweld A 7-Cb" are electrodes made for the all-position welding of stainless steels of the 18% chromium, 8% nickel type. Stainweld A 7, an improvement of an electrode discontinued during the war, is recommended for use with stainless steels designated by AISI numbers 304 and 308. It is suited for operation on direct current or with the higher voltage a-c welders. This electrode is available in 1/16, 5/64, 3/32, 1/8, 5/32 and 3/16 in. sizes.

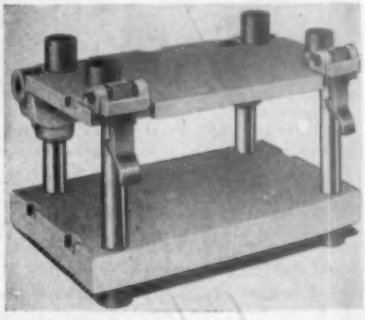
Stainweld A 7-Cb is a columbium-stabilized electrode recommended for use with stabilized 18-8 stainless steels designated by AISI numbers 321 and 347. It is furnished in 3/32, 1/8, 5/32, 3/16 in. sizes.

Both of these electrodes are recommended for weld-surfacing where an austenitic (work-hardening) surface of medium hardness and good corrosion resistance is required. Either will provide excellent resistance to impact and abrasion, manufacturer states. Hardness of a single layer, as deposited on mild steel is, 35 Rockwell C; work hardened, 48 Rockwell C. A multiple layer, as deposited, is 85 Rockwell B; work hardened, 42 Rockwell C. The average tensile strength of an all-weld metal specimen is 85,000 to 95,000 psi. Average elongation in 2 in. is 35 to 50%. THE LINCOLN ELECTRIC CO., Cleveland 1.

☆ ☆

Snap-Lock Jig

THE new "Fetherlite" snap-lock jig is constructed of lightweight special aluminum alloy said to be characterized by toughness, durability, and easy boring qualities. Its lightness—1/5 the weight of steel—renders it easy to shift to any position. The lock construction permits instant opening, closing and locking, manufacturer states. Interchangeable posts accommodate work of practically any height. HEDSTROM INDUSTRIES, INC., 4856 W. Division St., Chicago 51, Ill.



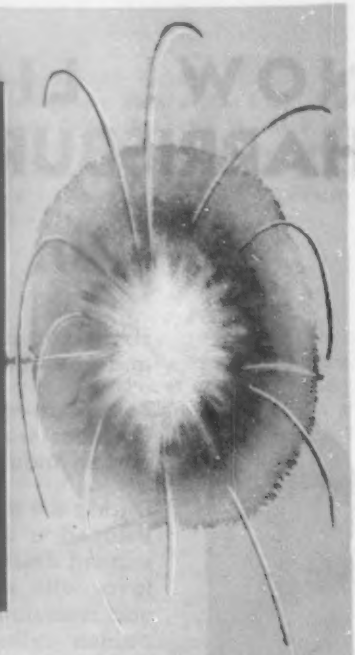
Aluminum alloy jig with clamping screws and snap-lock construction allows quick operation

☆ ☆

Portable Dust Collector

A PORTABLE plug-in dust collector incorporates a built-in grinding wheel in addition to the customary motor-driven fan, cyclone separator and filter. Though designed primarily for dry bench grinding, the dust collector has a wide range of other applications—buffing, polishing, and similar work which produces great amounts of long stringy material, lint, bristles, etc. ACEY-DETROIT CO., 602 First National Building, Ann Arbor, Mich.

THESE RACO PRODUCTS WILL SOLVE YOUR WELDING PROBLEMS



HEAVILY COATED ELECTRODES

Mild Steel

	AWS Type
RACO 7	E-6010
RACO 11	E-6011
RACO 8	E-6012
RACO 13	E-6013
RACO 20	E-6020
RACO 5	E-6030
RACO Ferritic	AC-DC

High Tensile Steel

RACO 74	E- 7010
RACO 8010	E- 8010
RACO 9010	E- 9010
RACO 10010	E-10010
RACO 7011	E- 7011
RACO 8011	E- 8011
RACO 9011	E- 9011
RACO 10011	E-10011
RACO 64	E- 7020
RACO 8020	E- 8020
RACO 9020	E- 9020
RACO 10020	E-10020

STAINLESS STEEL ELECTRODES

	AISI Type
RACOLLOY 18-8	308
RACOLLOY 18-8 CB	347
RACOLLOY 18-12 (2-3% Mo)	316
RACOLLOY 18-12 (3-4% Mo)	317
RACOLLOY 25-12	309
RACOLLOY 25-12 CB	309+CB
RACOLLOY 25-20	310
RACOLLOY 19-9	307
RACOLLOY 430	430
RACOLLOY 330	330
RACOLLOY 502	502
RACOLLOY 18-8 (1.5% Mo)	

AC-DC, DC Titania, and DC lime coatings are supplied in all grades except 430, 330 and 502

Hard Facing Electrodes

RACO 25 AC-DC - 20-25 C Rockwell
RACO 45 AC-DC - 40-50 C Rockwell
RACO 55 AC-DC - 50-60 C Rockwell

14% Manganese Steel Electrode

RACOLLOY Manganese AC-DC

Electrode for Cast Iron Welding

RACOLLOY Ni—Nickel Deposit

Electrode for Welding ARMCO Aluminized Steel

RACO Fer-Al AC-DC

LIGHTLY COATED ELECTRODES

RACO Type "D"—White Coat

Supplied in catchweight coils, rewound coils on steel bands for automatic welding or cut to 18" lengths.

RACO Type "M"—Brown Coat

Supplied in rewound coils on steel bands for automatic welding.

RACO Blue Label—Sull Coat

Supplied in catchweight coils or cut to 14" or 18" lengths.

Oxy-acetylene Welding Rods

RACO Red Label Mild Steel
RACO Red Label Pure Iron
RACO High-Tensile (1% Mn)
Supplied in coils or cut to 36" lengths

RACOLLOY Stainless

All standard core wire analysis furnished in 36" straightened and cut lengths.

Plain Mill Finish Steel Wire in coils or straighten and cut

Wire in Coils for Submerged ARC Welding

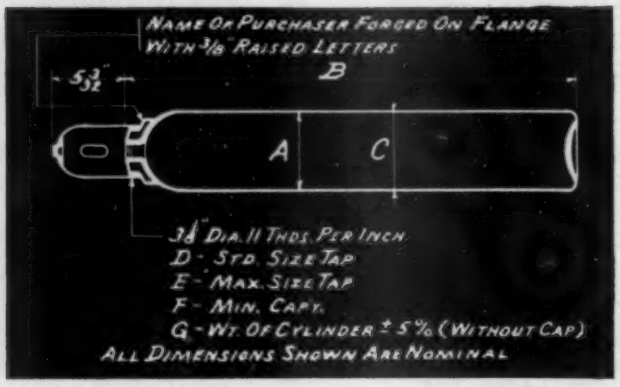
The REID-AVERY COMPANY
INCORPORATED
DUNDALK • BALTIMORE 22 • MARYLAND
SINCE 1919 PRODUCERS OF ARC WELDING ELECTRODES AND WELDING RODS

NOW! LIGHTWEIGHT HARRISBURG CYLINDERS in 3 new sizes

Harrisburg again leads the way to more economical and efficient transportation of Industrial Oxygen.

Before the war, the 220 cu. ft. Standard 8½" x 51" Cylinder was generally accepted for use in transporting industrial oxygen.

During the war, the Harrisburg Steel Corporation developed a 300 cu. ft. Lightweight Cylinder of advanced design. This new cylinder has found extreme favor with and has been accepted by compressed gas manufacturers everywhere. And now, as companion cylinders, "Harrisburg" offers a 350 cu. ft. and a 400 cu. ft. cylinder of advanced design. Here are specifications for Industrial Oxygen Lightweight Cylinders with emphasis on the new sizes.


NAME OF PURCHASER FORGED ON FLANGE
WITH 3/16" RAISED LETTERS
B
5 3/32
A
C
3/4" DIA. 11 THDS. PER INCH
D - STD. SIZE TAP
E - MAX. SIZE TAP
F - MIN. CAPY.
G - WT. OF CYLINDER ± 5% (WITHOUT CAP)
ALL DIMENSIONS SHOWN ARE NOMINAL

INDUSTRIAL OXYGEN

Cap'y Cu. Ft.	A Inches	B Inches	C Inches	F Cu. In.	G Lbs.	I.C.C. Spec.	Test Pres. Lbs. per Sq. In.
Std. size tap, ¾". Max. size tap 1". Detail Sketch Number on Request.							
55	5½	32	5⅞	660	29	3A-2015	3360
110	8⅜	43	6 11/16	1320	57	3A-2015	3360
125	6⅜	43	7	1320	64	3A-2265	3775
220	8½	51	8 15/16	2640	105	3A-2015	3360
250	8½	51	9	2640	115	3A-2265	3775
300	8¾	55	9¼	2990	131	3A-2400	4000
350	8¾	55	9¼	2990	153	3A-2800	4670
400	9 1/16	54¾	9¾	3210	174	3A-3000	5000
400	10 1/16	55½	10⅛	3985	186	3A-2400	4000

Specify Harrisburg LIGHTWEIGHT Cylinders for the transportation of Industrial Oxygen, Medical Gas, Carbon Dioxide

HARRISBURG STEEL CORPORATION
HARRISBURG, PENNSYLVANIA

"Paintstiks" for All Industry

NEWLY developed "Markal" paint sticks can be used for every marking job regardless of hot, cold, wet, dry or oily surfaces. Recent developments are Markal "M" and "K". The former can be used for metal surfaces which are to be annealed at temperatures of 1,800 F. The marking is done while the surface is cold; after the object is heated, the marks will withstand immediate quenching in water or oil. Markal "K" is applicable to objects heated from 1,600 to 2,000 F and will weather wind, rain or snow.

Other efficient paint crayons are Markal "C" and "N". "C" is designed for sheet steel, Bakelite, rubber and plateglass marking and is fadeproof and weatherproof. Markal "N", a quick drying crayon, is suitable for layout purposes on bare steel plates or on plates covered with zinc-chromate coating. All of these crayons except "M" are available in at least two colors; "M" is available in white only. MARKAL CO., 607 N. Western Ave., Chicago 12.

☆ ☆

Flux-Filled Solder

"TRI-CORE" is a new soldering wire having three independently filled cores of noncorrosive rosin flux. The arrangement of the three cores places them close to the surface. The solder melts more quickly, and the heat penetrates to the flux more rapidly, allowing it to reach the work ahead of the molten solder.

Tri-Core solder meets ASTM class "A" specifications and is available in all alloys and flux percentages. ALPHA METALS, INC., 369 Hudson Ave., Brooklyn 1.

New three-core quick-melting solder insures a continuous supply of rosin flux to the work

☆ ☆

Die Separator and Winch

A NEW die separator and winch, consisting of a removable boltless boom with adjustable hooks, has been developed for pulling dies and fixtures in and out of racks, presses, etc. It has a load capacity of up to 2,000 lb. The top section of the die is fastened by chains to adjustable hooks, and the platform is lowered to separate the two sections. Both winch and separator may be furnished with a standard model truck or added to a truck that is already in use. LYON-RAYMOND CORP., 2654 Madison St., Greene, N. Y.

Portable brazer for general copper brazing

Portable Tong Brazer

A PORTABLE 5-kva incandescent carbon brazing unit is offered by Westinghouse for such uses as making lap joints in copper strap, attaching terminals to cable, brazing coil ends and general coppersmithing work. The new brazer weighs 30 lb and is connected to a 220-volt source. It consists of a transformer, voltage selectors, controls and carbon-tipped tongs. Alternating current from the transformer passes through the tongs and melts the brazing alloy, which may be applied in either rod or ribbon form. Three outlets are provided on the control panel for 8, 6 or 4 volts. A foot switch with pilot cable serves as the primary control switch. WESTINGHOUSE ELECTRIC CORP., Box 868, Pittsburgh 30.

☆ ☆

Aluminum-Brazing Flux

"FLOW-WELL" is a new flux for brazing of aluminum with X716 wire that is equally useful in either furnace or torch brazing. It can be easily applied and will not solidify or deteriorate, claims manufacturer. The flux and wire may be employed to braze 61S, 2S, 3S, 24S and 52S aluminum alloys.

Flow-well is packaged in ½ and 1 lb glass jars and is also available in larger quantities. A. K. MAUK, 7501 Hamilton Ave., Pittsburgh 8.

☆ ☆

"Electro-Air" Control

A LOW-VOLTAGE electropneumatic control permits standard machine tools and fixtures to be converted to automatic or semiautomatic production units to perform a wide variety of operations such as automatic drilling, tapping, milling, indexing and holding.

The control, manufacturers state, may be used with any standard air cylinder. It can be furnished with a cycle timer to provide either single or multiple-cycle control. ELECTRO-AIR DEVICES Co., 2811 W. Fletcher St., Chicago.

Safety Leggings

A NEW leg and shin protection against heat, sparks, hot metal splashes and flying abrasive particles is afforded by a new legging that is manufactured in chrome leather tanned to resist heat and also in fireproofed duck or asbestos. Leggings are adjustable within a distance of six in. by means of a leather ear fitted with snap fasteners. A double chrome-leather flare extends over the entire shoe to protect both foot and ankle. SAFETY CLOTHING and EQUIPMENT Co., 7016 Euclid Ave., Cleveland 3.

New weldor's legging that protects leg, foot, and ankle against heat, sparks, etc.

☆ ☆

Wyse carbon-arc soldering unit. It may also be used to strip insulation from wire

Carbon-Arc Soldering Unit

DESIGNED for such work as armature winding, soldering leads and terminals, tinning, sweating, etc., the new "Arc-Melt" soldering unit uses any type fluxes and soft solder. Special attachments are also available for hard solder. The unit weighs 32 lb and is equipped with a carrying strap to take it to the job.

This new carbon-arc soldering device has been found applicable to small and delicate jobs such as gold and silver soldering on ornamental jewelry, optical and dental work, etc., as well as larger soldering jobs. It has 24 variable heats and employs a special copper-covered ⅛ or ¼ in. carbon electrode. For extra heavy work, a ⅜ in. carbon can be used with an adaptor.

An additional feature is a wire stripper located on the front of the unit. This attachment will strip wire in exact lengths without nicking or fraying the strands. It seals the ends as it strips off the insulation. WYSE LABORATORIES, 211 So. Ludlow St., Dayton 2, O.

☆ ☆

Air-Gas Mixer

"FLOMIXER" is the name of a newly made constant-ratio mixer for low-pressure air-and-gas burners. It utilizes the energy of a stream of air at pressures up to 3 psi to entrain a combustible gas and to deliver the mixture at high pressure for industrial gas-air heating equipment. Efficiency is almost 50%, manufacturer states. An air supply of one pound pressure will produce a mixture pressure of 13 in. water column with natural gas, 11½ in. with manufactured gas.

The gas ratio adjuster is a universal type, suitable for any type of gas. Gas from 550-3,200 Btu can be handled without change of equipment in case of change-over. The device is easily adjusted and may be sealed at any particular setting if desired.

"Flomixer" for mixing air and combustible gas

This unit is available in pipe sizes of from ¾ to 4 in. It is provided with square-flange joints, which are said to make possible a new flexibility of installation. BRYANT HEATER Co., INDUSTRIAL DIVISION, Cleveland.

☆ ☆

Heavy Current Transformers

A NEW line of transformers rated from 5 to 500 kva is offered for resistance welders, electric furnaces, rectifiers and other applications where heavy current is required. These transformers are available for any line voltage and frequency, single phase, 3-phase primary and 3-phase secondary or 3-phase primary and 2-phase secondary. MARCUS TRANSFORMER Co., INC., 32-34 Montgomery St., Hillside 5, N. J.

☆ ☆

Remote Speed Control

"FLECTROL" applied to commercial speed changers provides a finger-tip remote control of speed. The dial can be set to any speed, and the speed changer will follow as fast as the motor can drive the speed-adjusting screw. The dial can be calibrated in rpm, feet per minute, gallons per hour, etc. Any speed within the range of the changer can be selected with an accuracy of better than 2%. YARDENY LABORATORIES, INC., 105 Chambers St., New York City 7.

Ampco Metal, Inc.

Announces the first "AC-DC"

shielded-arc, aluminum bronze electrodes

Ampco-Trode AC

COATED ALUMINUM BRONZE ELECTRODES

. . . for use with BOTH low voltage, AC transformer type, AND direct current, generator type of welding machines

• CHECK THESE ADVANTAGES •

- ✓ AC-DC — heavy-coated — shielded-arc
- ✓ High deposition rate — low welding cost
- ✓ Wide variety of metals can be welded
- ✓ Smooth bead contour—perfect wash
- ✓ Low spatter loss—high efficiency
- ✓ Easy manipulation in all positions
- ✓ Five grades — 120 to 300 Brinell
- ✓ Soft, spray-type arc action
- ✓ High physical properties
- ✓ Dense, pit-free deposits
- ✓ Easy slag removal
- ✓ Assortment of sizes

Write for bulletin!

W-00

AMPCO

TEAR OUT COUPON! MAIL TODAY!

AMPCO METAL, INC., Dept. WE-5, Milwaukee 4, Wisconsin

Please send new data sheet on Ampco-Trode AC.

Name.....

Position.....

Firm.....

Address..... ☐ Home ☐ Business

City..... (.....) State.....

Optimum Spot-Welding Set-up Values

BASIC FACTORS APPLIED TO SPOT WELDING
(From Comparison of .040" Thicknesses)

Metal	Condition	Yield Strength .2% Offset	Melting Point °F	Electrical Conductivity % Copper	Electrodes		% Basic Mild Steel Value			
					Class Material ‡	Shape	Electrode Force,	Weld Current	Weld Time	Shear Strength
WROUGHT IRON	HR	30,000	2720	12	1	FR	100	90	100	90
STEELS—PLAIN										
Low Carbon (SAE #1010)	HR	40,000	2760	15	2	FR	100	100	100	100
	CR	50,000	2760	15	2	FR	120	110	100	120
Low alloy	HR	60,000	2750	15	1	FR	120	100	120	120
Alloy	HT	120,000	2720	15	2	FR	200	100	100	200*
Stainless SAE #321, 347	OH	40,000	2570	2.4	3	FR	120	60	80	140
	FH	100,000	2570	2.4	3	FR	200	70	100	200
STEELS—COATED										
Aluminized	...	40,000	2760	15	1	FR	120	110	100	100
Cadmium-plated	...	40,000	2760	15	1	FR	120	110	100	100
Chrome-plated	...	40,000	2760	15	2	F	110	100	100	100
Copper-plated	...	40,000	2760	15	1	FR	110	110	100	100
Galvanized	...	40,000	2760	15	1	FR	120	110	100	100
Nickel-plated	...	40,000	2760	15	1	F	110	100	100	100
Terneplate	...	40,000	2760	15	1	FR	120	110	100	100
Tin-plated	...	40,000	2760	15	1	F	110	100	100	100
ALUMINUM ALLOYS										
2S	0	5,000	1210	59	1	1"R	80	250	80	22
3S	½H	18,000	1200	41	1	2"R	100	280	80	32
52S	½H	29,000	1170	40	1	3"R	130	300	80	42
Alclad 24S	T	43,000	1070	30	1	3"R	200	320	80	40
MAGNESIUM ALLOYS										
Dow Metal "M" 1.5 Mn	...	27,000	1290	29	1	3"R	130	290	80	28
"J" 6. Al	...	34,000	1140	13.5	1	6"R	170	230	80	33
NICKEL	A	20,000	2625	18.2	2	F	100	120	80	90
	CR	95,000	2625	18.2	2	F	140	140	100	110
NICKEL ALLOYS										
Nichrome 20 Cr	CR	60,000	2550	1.6	2	F	120	50	120	120
Inconel 13 Cr	A	35,000	2570	1.8	2	F	100	40	100	110
	CR	110,000	2570	1.8	2	F	140	60	120	160
Monel 30 Cu	A	35,000	2400	3.6	2	F	100	60	100	110
	CR	100,000	2400	3.6	2	F	140	70	120	140
Nickel Silver 10 Ni	CR	75,000	1850	8.3	2	FR	120	100	120	130
COPPER	CR	48,000	1980	100 †	Mo	3"R	100	350	100	100
COPPER ALLOYS										
Red Brass 85 Cu	CR	70,000	1875	37	13	4"R	120	190	120	120
Yellow Brass 65 Cu	CR	75,000	1710	26	2	4"R	120	150	120	130
Admiralty Bronze 70 Cu	CR	90,000	1715	25	2	4"R	120	150	120	140
Naval Brass 60 Cu	CR	65,000	1625	25	2	4"R	120	150	120	120
Muntz Metal 60 Cu	CR	80,000	1660	29	2	4"R	120	150	120	130
Manganese Bronze 58 Cu	CR	60,000	1645	25	2	4"R	110	140	120	120
Phosphor Bronze 5 Sn	CR	75,000	1920	18	2	4"R	120	120	120	130
Aluminum Bronze 8 Al	FH	105,000	1905	15	2	4"R	120	110	120	150
Silicon Bronze 3 Si	CR	70,000	1865	6.7	2	4"R	120	80	120	130
Nickel Silver 10 Ni	CR	75,000	1850	8.3	2	FR	120	100	120	130
PRECIOUS METALS										
Silver	CR	40,000	1760	106 †	Mo	F	100	350	100	100
Gold	CR	30,000	1945	71 †	Mo	F	100	330	100	80
Platinum	CR	27,000	3225	15	1	F	100	110	100	80
Paladium	CR	32,000	2830	15	1	F	100	100	100	90

† Weldability improved by plating. Difficult in thicknesses over .030".

‡ Resistance Welder Manufacturers Association "Equipment Standards"

* Many alloy steels require heat-treatment after welding for satisfactory physical properties. See legend below Table 1.

Courtesy, Westinghouse Electric Corp.

THE WASHINGTON NOTEBOOK

SURPLUS aluminum sheets originally rolled for aircraft manufacturers, are now being purchased in large quantities by construction companies. They will tend to corrode somewhat unless painted but apparently have no other drawbacks. Aluminum sheets possessing non-corroding qualities may be obtained, of course, but surplus plane stocks are cheaper. An opportunity for a spot-welded roof, we think.

WELDER CEILINGS REMOVED

OPA has announced the relaxation of ceilings on many machinery and equipment items, including all types of welding equipment except a-c transformer-type welders. Removal of ceilings is not expected to have any particular effect on prices inasmuch as welding equipment manufacturers had recently announced slight increases under OPA regulations. It is not believed further increases are imminent.

The Big Inch pipe line has been put up for sale and will apparently be continued as an oil pipe line rather than a gas pipe line. Fear has been expressed over the possibility of steel industries converting to gas, which would leave them without a fuel source in the event of another war. If so, it may be necessary to revert the Big Inch to petroleum transportation.

THE PRODUCTION OUTLOOK

Production of consumers' durable goods continued to rise during February, but many other industries were affected by work stoppages, particularly steel and electrical. The settlement of the General Electric, General Motors, International Harvester and the steel strikes have paved the way for a rapid increase in the output of much needed products as soon as the flow of materials and component parts can be re-established. A long coal strike, however, may again curtail steel production. Should the coal strike continue to May 15, the losses in steel production will nearly equal those caused by the steel strike. In that event, production will be retarded until well in the third quarter.

Approximately 123,000 mechanical refrigerators were shipped during January. This is only about 30% of the 309,000 units scheduled. Several large producers shipped no refrigerators after January 15 because of strikes. February shipments were expected to be even lower than January because of labor difficulties throughout the industry.

Around 25,000 electric ranges were shipped in January as compared to 29,000 in December. Here again the shortage of steel and component parts and work stoppages limited production to 52% of the prewar average of 47,000 ranges a month.

BICYCLES AND AUTOS

Bicycle production was up to 83% of the base period production of 155,000. A total of 129,000 bicycles was shipped in January. While this industry was able to obtain adequate welding and brazing supplies, it experienced some difficulty in obtaining steel and such components as coaster brakes.

The steel strike caused automotive production to drop to 47,965 units in February from 58,575 in January. The impact of the strike on automobile production was not nearly as severe as it was on trucks and many other heavy users of steel. Commercial truck production in February was only 28,594 units as compared to 54,791 in January.

Washington has long been an important source of business information, and present activities there should be of interest to the readers of THE WELDING ENGINEER. Consequently, we have decided to include a page of Washington news. If you would like to have this feature continued, please write and tell us so.

Railroad passenger car production is practically at a standstill inasmuch as the steel workers making such equipment did not go back to work with the settlement of the general steel strike. Production of freight cars for domestic use decreased to 2,105 in February as compared to 3,040 in January. There has been practically no change in the backlog of about 85,000 freight cars for domestic use and 35,000 for export. The export figures include 36,750 twenty-ton cars for France. These are about half the normal-sized freight car and should be produced much faster.

MAINTENANCE BACKLOG GROWS

The percentage of rolling stock on railroads awaiting repair has increased from 2.4% during the war to a level of 4.3% as this is written. The shortage of repairmen and mechanics is a contributing factor. There is also a shortage of proper repair parts. The continued combination of undermaintenance and overuse in railroad equipment has resulted in a large number of excessive units of rolling stock.

Railroad locomotive production was practically at a standstill in February because of the steel strike. The backlog of orders continues to increase, and orders for both steam and large Diesel engines exceed 1,000 each. An interesting point is that 90% of the steam locomotives are for export while over 90% of the large Diesel locomotives are for domestic use.

Despite labor difficulties, farm machinery production continued to increase to a new high in January. The production of some 300 manufacturers representing about 90% of the industry was at $61,000,000 for January as compared to a monthly average of $55,000,000 for December, November and October. Production in February and March was expected to be decreased drastically because of increased work stoppages, affecting about 40% of the industry. Sheet steel, used extensively in the production of farm equipment, is also short because of the steel strike.

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ACTUAL STATEMENTS MADE BY WELDERS, WELDING SUPERINTENDENTS, PURCHASING AGENTS, WELDING SERVICE OPERATORS AND PLANT ENGINEERS

"...Have never found a rod that will do what this Ni-Rod is doing..."

"...This rod is an answer to a welder's dream..."

"...Best cast iron welding rod we ever had."

"We have found that Ni-Rod allows the foundry to cut the amount of different kinds of rods used down to six."

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"...the best rod for cast iron we have had yet, and we have tried them all..."

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"Ni-Rod is very good to break in new welders with -- its penetration and flexibility will not let them get into trouble."

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"We feel confident our business will increase 25% since we have now found a rod we can arc weld cast iron with and guarantee that the welds can be machined without any difficulty..."

NI-ROD REPAIRS CASTINGS QUICKLY... EASILY

Test Ni-Rod on your next job. Order a 5-lb. package and see how easily it gives you strong, sound, machinable welds in cast iron.

If your nearest dealer does not carry Ni-Rod, write us direct to learn where you can quickly get this new easy-handling electrode.

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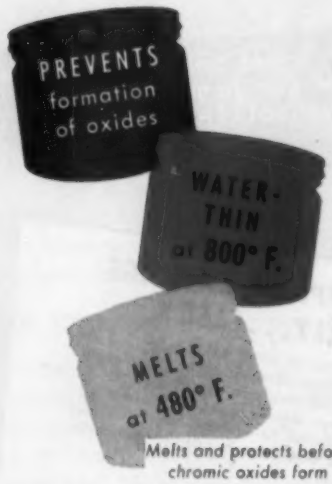

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Makers of NU-BRAZE silver brazing alloys
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News of the Industry

Warren City Mfg. to Build All-Steel Welded Presses

FULL-SCALE production of a complete line of all-steel welded mechanical and hydraulic presses will begin shortly in the modern $7,000,000 plant of the Warren City Mfg. Co., Warren, O. This company is now a subsidiary of the Federal Machine and Welder Co., also of Warren. The presses (see page 66 this issue) will be a natural adjunct to the line of resistance-welding equipment made by the parent concern.

Engineering and design of the new presses is under the supervision of Albert Clements, chief engineer, who was formerly with the Verson Allsteel Press Co., Chicago.

The Warren City plant was enlarged and equipped by the U. S. Navy in 1942. During the war, it produced all-welded LCM landing craft, Diesel-engine crankcases, generator bases and oil pans, gear-reduction drive units for cargo vessels and fighting ships, boiler turbine cases, gun rails, hull assemblies for Alligator amphibian tanks, etc.

☆ ☆

Dept. of Commerce Offers German Research to Industry

THE Department of Commerce is now offering American industry the almost priceless privilege of studying captured German industrial and scientific documents. In order to know what American industry is looking for, the Department urgently invites suggestions as to the specific information desired. These suggestions will guide in directing the work of the men who are examining the documents. Address: Office of Publication Board, Dept. of Commerce, Washington 25, D. C.

To scan the great mass of captured material, technical men are needed in the fields of aeronautics, chemicals, automotive, machine tools, general industrial equipment, fuels and lubricants, metals and minerals, communications equipment, scientific instruments, shipbuilding and textiles. A knowledge of technical German is essential.

☆ ☆

New Firm Enters Welding Field

J. A. Cunningham, T. F. Ryan and H. F. Flynn, all formerly of Arcway Equipment Co., Philadelphia, have formed their own company, J. A. Cunningham Equipment, Inc. with headquarters in Philadelphia. The new distributorship will serve a territory including eastern Pennsylvania, eastern New Jersey and Delaware. It will handle Harnischfeger arc welders, electrodes and positioners, Reid-Avery electrodes and oxy-acetylene welding equipment and accessories manufactured by the Black Mfg. Co.

Mr. Cunningham is president and principal stockholder of the new concern. Mr. Ryan is treasurer, and Mr. Flynn is secretary. Mr. Cunningham was in charge of advertising, sales promotion and welding problems for Arcway and developed the two-tone welding process while he was with this firm. Mr. Ryan was assistant buyer for the E. G. Budd Mfg. Co., Philadelphia, from 1940 to 1943 and sales representative for Arcway from 1943 to 1946. Mr. Flynn was electrician and radar technician for N. Y. Shipbuilding Co. for four years. He joined Arcway in Sept., 1945.

☆ ☆

AFA Meeting May 6 to 10

THE 50th anniversary of the American Foundrymen's Association was scheduled to be held May 6 to 10 in Cleveland's public auditorium. A total of 10,000 foundry executives and technologists from all over the country were expected to attend the 60-session conclave and visit the concurrent foundry equipment and materials show.

A session devoted to the repair of welding of gray-iron castings was slated to be held the afternoon of May 10 under the chairmanship of Edgar C. Jeter, Ford Motor Co., with John Crowe, Air Reduction Sales Co. acting as co-chairman.

The "Metallurgical Aspects of Repair Welding of Gray Iron" were to be covered in a paper prepared by three General Motors welding experts: J. A. Blastic, Detroit Diesel division; J. A. Griffin, Pontiac motor division; J. M. Diebold of the G-M-C truck and motor coach division. A companion paper on the "Physical Aspects of the Welding of Gray Iron" was to be presented by W. Pfander of the Ford Motor Co. L. J. Larson, welding engineer of the engineering development department of Allis-Chalmers Mfg. Co., was to be the guest speaker on the subject, "Welding of Heavy Gray Iron Sections."

☆ ☆

Navy Ordnance Awards Battelle Institute

BATTELLE MEMORIAL Institute, Columbus, O., was recently presented the Naval Ordnance Development Award by the Navy Bureau of Ordnance. The recognition was based specifically on the Institute's contributions to the development of welded net panels for submarine torpedo nets. The award is the fifth of a series presented to the Institute.

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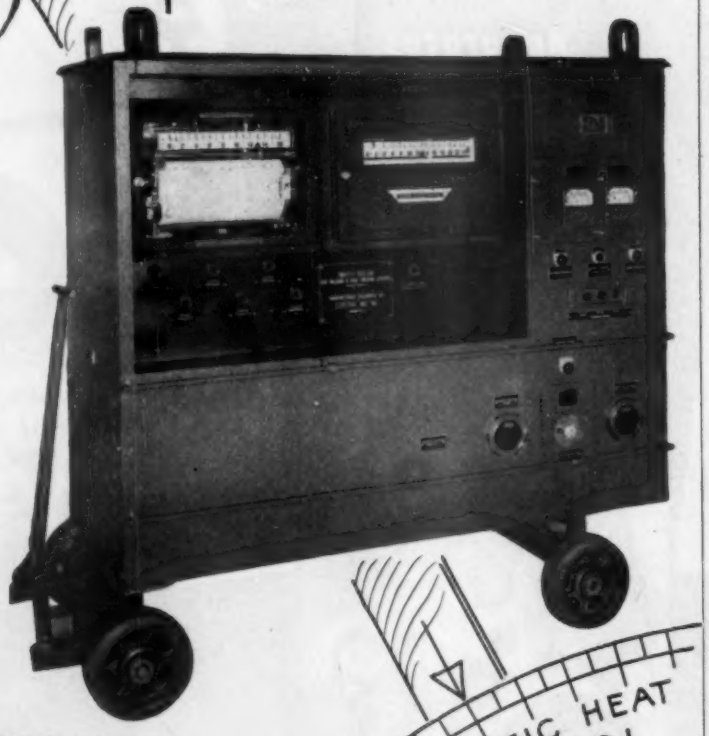

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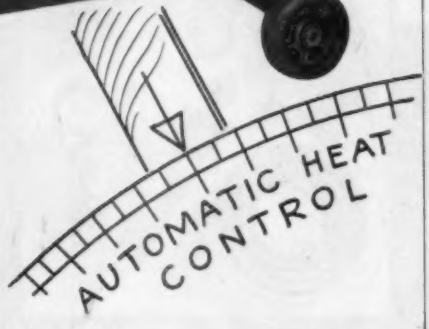

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Once the metallurgical heat-cycle for the steel has been determined, it is only necessary to set the controls, and the machine shown above will deliver this program from start to finish! In addition, recorded charts keep permanent records for duplication of results. A complete unit for efficient performance. Temperatures up to 1750° F. readily obtainable.

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Welding Engineer Moves to New Chicago Address

BEGINNING on May 1, editorial and publication offices of THE WELDING ENGINEER and *The Welding Encyclopedia* will be located in the McGraw-Hill Building, 520 No. Michigan, Chicago 11. The new quarters provide a much needed increase in floor space for the editors.

Executive, sales and circulation offices of THE WELDING ENGINEER continue at 330 W. 42nd St., New York City 18. All correspondence regarding advertising and circulation matters should be directed to the New York address.

☆ ☆

AWS Sets Nov. 17-22 for Annual Meeting

THE 1946 annual meeting of the American Welding Society will be held in New York City on October 24, 1946, in order to comply with requirements of the society's Constitution. This meeting, however, will be adjourned immediately, without transaction of business, and will reassemble in Atlantic City on Nov. 17 to 22. The reassembled annual meeting will then be held in conjunction with the 28th National Metal Congress and Exposition, to be held at the same time and place. The committee has already begun to plan the program, which will include prewar social activities as well as the usual technical sessions.

☆ ☆

Bergstrom Alloys Becomes Industrial Overlay Metals

THE Bergstrom Alloys Corp. of Reno, Nev., manufacturer of alloy electrodes, has changed its company name to Industrial Overlay Metals, Inc., with offices at 224 So. Michigan, Chicago. A new plant will be built in Ohio as soon as present building restrictions are released. The trade name "Bergstrom" will be retained to identify the present line as well as new items in process.

An enlarged sales and service program is now being put into effect. Belmont Smith has been made vice-president in charge of sales, and Arnold Edwards, treasurer, in charge of manufacturing and development. Roy Bergstrom will continue to be associated with the company.

☆ ☆

New Firm Enters Distributor Field

ROY NORTON has resigned as general sales manager of Alloy Rods Co., York, Pa., in order to form his own company, the Norton Welding Equipment Co., 444 No. Twenty-Ninth St., Milwaukee 8. The new company is acting as distributor for Glenn-Roberts Co., The Champion Rivet Co., Alloy Rods Co. and Victor Equipment Co., handling the usual lines of welding equipment and accessories.

☆ ☆

Central Steel Moves

CENTRAL STEEL Construction Corp. has moved its office to 210 Dingens St., Buffalo 6, New York.

7
REASONS WHY
SOLAR
WELDING FLUX No. 16 GH
IS THE BEST FOR THE WELDING OF STAINLESS STEEL

why SOLAR FLUX was manufactured

For fifteen years Solar Aircraft Company has devoted itself to the design and fabrication of products made of stainless steel and similar alloys. Its principal business is the manufacture of airplane exhaust systems.

To withstand the intense heat of exhaust gases, airplane manifolds must be perfectly welded.

To accomplish these results with minimum time and application effort, the Research Department of Solar developed Solar Stainless Steel Welding Flux No. 16 GH.

This flux was first used and developed exclusively for Solar's own plants. It proved itself so successful that other plants which needed a specialized flux for the welding of stainless steels made arrangements to use it. They, too, have found that for better and speedier welding and fewer rejects SOLAR FLUX No. 16 GH has no equal for the following reasons:

1. EASY TO USE

Solar Flux is easily applied with a brush. It dries quickly because it is mixed with methanol—thus parts can be welded immediately after application.

2. ADHERES BETTER

Solar Flux sticks to the metal because of the use of Methanol and its mineral binder. So tenatious is it that it will adhere to the metal in spite of frequent handling. Parts can be fluxed and stacked days ahead of actual welding, thus facilitating faster production flow.

3. IT GOES FURTHER

Because SOLAR flux can be thinly spread over the weld area—it gives from 15% to 20% greater coverage.

4. NO BINDER—NO "ETCHING"

SOLAR flux requires no shellac or other binders that cause carbon pick-up by the metal being welded.

5. PREVENTS "BURNING" (Oxidation)

SOLAR flux prevents "burning" or oxidation of molten metal during welding because certain inhibitors have purposely been introduced into the flux to prohibit the penetration of oxygen. It prevents pinholes by better elimination of trapped gases.

6. DUCTILE WELDS

Unless welds remain ductile during forming and bending, they will crack or check. Army and Navy certification of welders require that welds must not show failure by checking or cracking when bent through an angle of 180°.

SOLAR research discovered that the presence of too much boron in flux contributes to cracking. In SOLAR FLUX the boron content is carefully controlled, thus ductile welds are uniformly obtained—there are fewer rejects on inspection.

7. NO TOXIC FUMES—WIDER APPLICATION

SOLAR FLUX can be used with oxy-acetylene, atomic hydrogen or metallic arc processes with equal ease and benefit. It gives off no toxic fumes—no special ventilation is needed in the welding room.

Solar Flux Complies with Army Air Force Specification No. 11314
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AD 145

Farmers Can Make Money on Their Rainy Days

A WELDER makes rainy days profitable to farmers, Daniel F. Galusha of the Fairfields Farm, Williamstown, Mass., declared in a recent address on the General Electric Farm Forum. "A few jobs of welding that I have done with quite satisfactory results are building up plow points, repairing broken castings on a side rake, grain drill and harrows, and constructing a small trailer." He said, "Little jobs such as welding broken tines on pitchforks and building up worn parts on drinking cups provide a profitable way to spend a few minutes on a rainy day.

Initial cost of the welding machine may cause many farmers to hesitate, Mr. Galusha asserted. Over a period of time, however, the initial cost will be offset by the fact that the welder is always at hand to make the required repair.

☆ ☆

Western Metal Show March 22 to 29, 1947

THE AMERICAN Society for Metals will hold a Western Metal Congress and Exposition in San Francisco from March 22 to 29, 1947, it was announced at a recent meeting of the Golden Gate Chapter by Bill Eisenman, national secretary. Preliminary preparations are already under way and floor plans for exhibitors will be ready by August, according to John E. Dorn, chairman of the San Francisco group. The show will be held in the San Francisco civic auditorium.

☆ ☆

AISI General Meeting in New York May 23

THE 54th general meeting of the American Iron and Steel Institute will take place on May 23 at the Waldorf-Astoria in New York. Among speakers at the morning session will be Walter S. Tower, AISI president, E. M. Voorhees, chairman, Finance Committee, U. S. Steel Corp., Quincy Bent, vice-president, Bethlehem Steel Co., and Walter E. Watson, vice-president, Youngstown Sheet and Tube Co.

A technical session will be held in the afternoon under the chairmanship of J. L. Mauthe, vice-president, Youngstown Sheet and Tube Co. Technical papers on subjects of general interest will be presented at this session by Herman Dobscha, Carnegie-Illinois Steel Corp., S. D. Gladding, Bethlehem Steel Co., Charles L. Potter, Jones & Laughlin Steel Corp., and C. R. Fondersmith, American Rolling Mill Co.

☆ ☆

Expiring Patents Digested in New Weekly Publication

"PUBLIC Domain," a unique new weekly publication, will make its first appearance this month. Each issue will be a 250-page reference book describing over 1,000 patents that are due to expire within four weeks after date of issue and including a good reproduction of a draftsman's drawing together with a condensation of typical claims and salient features. This digest is published by the Scientific Development Corp., 614 W. 49th St., New York City 19.

☆ ☆

Willson Develops Educational Program

A SERIES of safety posters that sell eye protection to workers on a basis of personal benefit has been developed by Willson Products, Inc., Reading, Pa. The program is designed to get workers to show the same regard for their own eyes as they do for personal property. Colorful and compelling Kodachrome pictures show the joys of life which only a man with full sight can know. Contrasted is a large patch of black nothingness.

New Distributors

METAL & THERMIT CORP., New York City 5: (Distributors for the complete line of Murex electrodes) Hill Equipment Engineering Co., St. Louis; Mid-County Supply Co., Stephenson, Mich., Johnson Service & Supply, Little Falls, Minn.; J. T. Shelton & Son, Odessa, Tex.; Welding and Industrial Products, Ltd., Honolulu, T. H.; José Cestero, Jr., Puerto Rico.

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The Wilson electrode No. 200 is a general-purpose, D.C. reverse polarity, aluminum bronze rod offering you highest-quality welding at low cost. Designed for flat and horizontal welding, it produces deposits having the desirable properties of aluminum bronze, especially its high strength . . . hot ductility . . . and corrosion resistance.

In addition, this popular electrode may be used successfully for brazing dissimilar metals such as iron to steel . . . arc welding the phosphorous bronzes (copper, tin, phosphorous alloys) . . . producing sound, clean welds having high mechanical properties and excellent appearance on manganese bronze, Muntz Metal and brass . . . and obtaining good results when arc welding malleable iron, clean cast iron and steel.

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About People

J. A. WAGNER, former vice-president of engineering and sales of the Advance Tool and Die Co., Detroit, was elected vice-president and manager of Sommer and Adams Co., Cleveland, subsidiary of The Federal Machine and Welder Co. Mr. Wagner brings to his post a background of wide experience gained during the war when he was supervisor of production for Sommer and Adams.

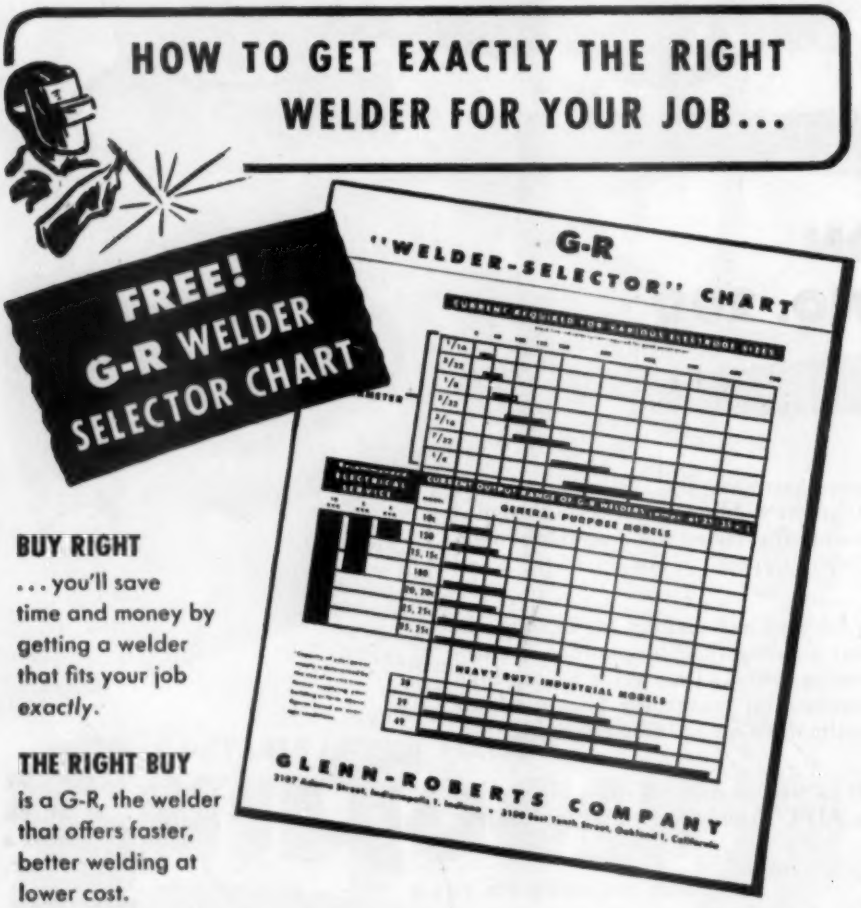
☆ ☆

WALTER L. LONGNECKER has been appointed division superintendent of the rod mills in the Cuyahoga works of the American Steel & Wire Co., Cleveland.

GILBERT L. COX, metallurgical and chemical engineer for International Nickel Co., Inc., has been appointed head of the empire state technical section of the company's development and research division. Mr. Cox has been associated with International Nickel since 1931, serving in various capacities in its development and research division. At one time he specialized in corrosion engineering, particularly in regard to the applications of high-nickel alloys, nickel-alloy steels and cast irons.

☆ ☆

HENRY W. DODGE, former vice-president and general sales manager of The Texas Co., has been elected chairman of the board of Air Products, Inc. This company was organized before the war to develop an advanced method of producing oxygen on the premises of the ultimate consumer. The process was perfected in time to meet the wartime demand for oxygen, and its equipment has been used by Allied military forces over most of the world.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MAJOR GENERAL GLADEON M. BARNES, chief of the research and development service, office of the chief of ordnance, U. S. Army Service Forces, has been awarded the 1946 Elliott Cresson gold medal of The Franklin Institute.

☆ ☆

HENRY A. STIX, treasurer of The Federal Machine and Welder Co., Warren, O., and its subsidiaries, Warren City Manufacturing Co., Warren, and Sommer and Adams, Cleveland, has been elected executive vice-president of Federal.

☆ ☆

JOHN F. MCFEETERS has joined the staff of welding engineers in the Kansas City, Mo., office of The Lincoln Electric Co., Cleveland. HUBERT G. HINKLE has been assigned welding engineer in the Columbus, O. area. K. S. LAMB has been named welding engineer in the New York territory, and THOMAS W. DAY has been appointed welding engineer at the St. Louis office.

☆ ☆

NORMAN A. MATTHEWS, former Lt. Col. in the U. S. Ordnance Department, has been appointed works metallurgist of electro-alloys division of the American Brake Shoe Co. In his new position, Mr. Matthews expects to facilitate the field and foundry utilization of new technical information that is developed in Brake Shoe's research laboratories.

☆ ☆

DR. F. R. HENSEL, chief metallurgical engineer for P. R. Mallory & Co., Inc. since 1934, has been elected vice-president in charge of engineering. Dr. Hensel has presented more than forty scientific and technical papers before various metallurgical and other scientific societies and has been granted more than 140 patents on alloys and metallurgical processes.

☆ ☆

J. R. G. HARRIS has been appointed manager of resistance-welding electrode sales for Ampco Metal, Inc., Milwaukee. D. S. GOEBEL has been appointed manager of mill products sales, and G. E. MCCULLOCH is now manager of safety tool sales. AL JENSS has been appointed manager of the corporation's licensing bureau.

☆ ☆

WALTER PESTRAK has been appointed sales representative for Progressive Welder Co., Detroit, in its new southeastern Ohio and western Pennsylvania area. Mr. Pestrak has been associated with the Duer Engineering Co. as Progressive's field sales engineer in this area for the past several years.

☆ ☆

RALPH H. LICHTNER, formerly division sales manager for West Penn Power Co., has been named general sales manager of the Titan Metal Mfg. Co., Bellefonte, Pa. He succeeds J. B. CRAIG, vice-president, who has been appointed controller.

STACKPOLE
WELDING SUPPLIES

WELDING CARBONS

Stackpole welding carbons are available in a complete line of carbon, carbon-graphite, and graphite types to match individual production requirements. Scientifically formulated for maximum penetration and stability at high current densities, they are supplied in practically any desired shape, taper, or diameter. Write for details.

WELDING PLATES AND PASTE

As long-time specialists in the compounding and processing of carbon in practically all of its forms, Stackpole engineers have brought welding paste and plates to a high degree of efficiency. The plates can readily be cut or filed to any shape while the paste can easily be molded. Neither one will liquify when heated, hence will not adhere to molten metal. Stackpole Welding Paste can quickly be torch-dried without danger of blistering, bubbling, or spalling.

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(carbon, graphite, metal, and composition types)

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PACKING, PISTON, and SEAL RINGS · POWDER METALLURGY · RHEOSTAT PLATES and DISCS

H. L. CROWDER, traffic manager of the Pennsylvania Salt Mfg. Co., since Jan. 1, 1918, recently announced his retirement. J. G. ROBISON, assistant to Mr. Crowder has been appointed new traffic manager for the company. WILLIAM J. ROBB has been named Mr. Robison's assistant.

☆ ☆

DR. SANFORD A. MOSS, consulting engineer for the General Electric Co., has been awarded the Potts medal of the Franklin Institute in consideration of the value of his work in making a turbo-supercharger a successful and reliable part of an internal combustion engine.

R. H. PORTERFIELD has been appointed manager of a new branch office in the New England district of the Allis-Chalmers Mfg. Co., located at 1607 Industrial Trust Bldg., Providence, R. I. R. E. SCUDDER has been assigned to the new Providence branch as salesman.

☆ ☆

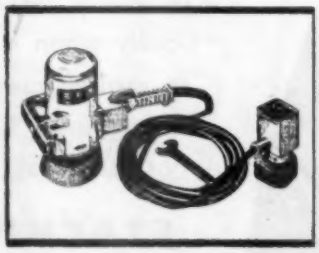
RALPH K. ALEXANDER, formerly district sales manager for Ceco Steel Products Corp. at Oklahoma City, has been appointed the firm's Texas manager with headquarters in Houston. WILLIAM A. SMITH, assistant manager at Washington, D. C., has been named assistant to Mr. Alexander.

New Portable Grinder Lasts Longer ...Increases Production

The Portable Gaston Grinder is designed for the grinding and sanding of metal—also, with wire brushes, for paint and rust removal. Because it is powered by a 3-phase motor, without brushes, commutators or gears, the Gaston will give long service.

The Gaston Grinder starts at full speed. Its speed remains constant regardless of extra pressure by the operator. This controlled speed under heavy load, eliminates glazing of the grinding wheel; produces a better ground surface.

Three sizes of dust-tight Gaston Grinders are available. Furnished in either "cup-wheel" or "edge-wheel" type, as desired.



The Portable Gaston Grinder

In a dusty work atmosphere, that causes throat irritation and dryness, chewing Wrigley's Spearmint Gum helps keep workers' mouths moist and fresh—thereby reducing work interruptions—and "time out" to the drinking fountain.

Workers can stay at their machine, while chewing Wrigley's Spearmint—even when their hands are busy. There is no lost time. And the pleasant chewing helps keep them alert and wide-awake. One Connecticut manufacturer with a dust problem reports group production up about 3% over normal, when workers were given chewing gum. Other plants and factories everywhere, claim stepped-up efficiency when chewing gum is made available to all.

You can get complete information from William H. Howland 2533 East 73rd Street, Chicago 49, Illinois

AA-68

A. M. SARGENT, Pioneer Engineering Co., Detroit, was recently elected president of the American Society of Tool Engineers at the annual meeting of the board of directors. Mr. Sargent is succeeded as first vice-president by W. B. PEIRCE, vice-president, Flannery Nut and Bolt Co., St. Louis, and formerly second vice-president of the ASTE. T. P. ORCHARD, general manager, American Tool Engineering Co., N. Y., was elected second vice-president.

☆ ☆

NORMAN A. MATTHEWS, former Lt. Col. in the U. S. Ordnance Department, has been appointed works metallurgist of electro-alloys division of the American Brake Shoe Co. In his new position, Mr. Matthews expects to facilitate the field and foundry utilization of new technical information that is developed in Brake Shoe's research laboratories.

☆ ☆

DR. BENJAMIN J. LAZAN, vice-president and chief engineer of Sonntag Scientific Corp., Greenwich, Conn., has been appointed associate professor of metallurgy, and director of the materials testing laboratory in the College of Applied Science, Syracuse University.

☆ ☆

C. L. MILLER has been appointed purchasing agent of The American Welding & Manufacturing Co., Warren, O. Mr. Miller has spent 14 years in the purchasing and stores division of public utilities and transportation systems.

☆ ☆

RICHARD W. DARROW, former assistant to the president of the American Meat Institute, Chicago, has been appointed director of public relations for The Glenn L. Martin Co., Baltimore.

☆ ☆

RICHARD G. TAYLOR, former secretary of Scaife Co., Oakmont, Pa., has become St. Louis manager of the Harris Calorific Sales Co., distributor of gas welding and cutting equipment.

☆ ☆

RALPH C. HARRISON has joined the Universal Power Corp. as welding engineer for sales of arc and oxy-acetylene equipment, high-frequency induction heating and power plants.

☆ ☆

DAN K. HEIPLE has returned to R. G. LeTourneau, Inc., Peoria as field engineer in the installation department. Mr. Heiple has been absent from the firm since early 1942, when he joined the U. S. Navy.

☆ ☆

R. S. STOVER has been appointed supervisor of the Philadelphia-Washington district of Ampco Metal, Inc. His headquarters will be in the Wiford Bldg., in Philadelphia.

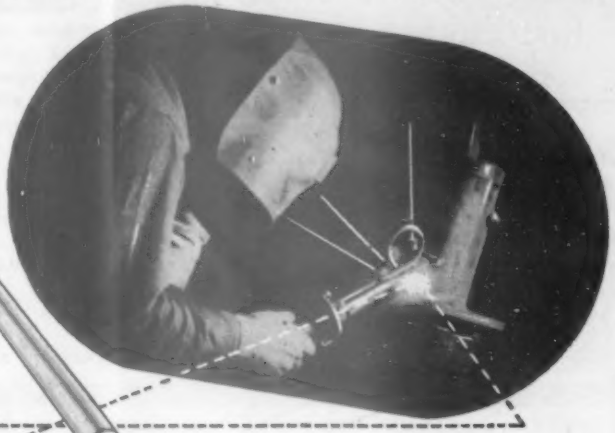
Callite PURETUNG electrodes 99.9% PURE TUNGSTEN

99% PURE TUNGSTEN WELDING ELECTRODES

Speed fabricating and repairing by atomic hydrogen process —

Slowly consumed—they are economical to use

Especially efficient for hard-to-weld metals



Callite — PURETUNG ELECTRODES

Standard and special-polished, clean and black. 7 standard diameters; 12-inch lengths. Random lengths and other diameters on special order.

If you are welding aluminum, duraluminum, nickel, chrome, molybdenum steels, copper, stainless steel, brass or bronze—Callite Puretung Electrodes will save you time and money. Well-known aircraft and machine tool manufacturers have found that Puretung Electrodes last longer—reduce grinding and finishing. Investigate their many advantages. Callite Tungsten Corp., 549 Thirty-ninth Street, Union City, New Jersey. Branch Offices: Chicago, Cleveland.

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FARM and SERVICE STATION PORTABLE A. C. WELDERS

Built-in Capacitor for High Power Factor Correction — Meets R.E.A. Requirements — Also Reduces Power Bills and Installation Costs

Model N115 Exterior View

☆ ☆

Model N115—Has a New Power Packed Multiple-Coil Transformer, Features 4 Coils Instead of 2. Also Separate Reactance, Double-Woven Spun-Glass Insulated Magnet Wire. 15 to 115 Amperes.

Model N115 Interior View

MODEL NF180 — Has the Same Transformer as our World Famous Variable Core Type Heavy-Duty Industrial Models with Handwheel Stepless Amperage Control. Double-Woven Spun-Glass Insulated Magnet Wire. 20 to 180 Amperes.

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Manufacturers
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Helpful Literature Just Published

Unless otherwise stated, the publications reviewed in this section may be obtained without cost by writing to the manufacturers listed.

Metallic Corrosion Booklet

ONE of the paradoxes of the corrosion problem is that the action of two chemical elements together in metal may be greater or smaller than the sum of the effects of each element separately, explains Dr. John Johnston, director of the research laboratory of the U. S. Steel Corp., in a new 16-page booklet called "Corrosion of Steels."

Roughly, a copper steel containing 0.20% copper is believed to be twice as resistant to atmosphere as a plain carbon steel, but this advantage varies with the type of atmosphere. Galvanized copper is said to last longer than galvanized steel because of the better resistance of the base metal. On the other hand copper steel is generally regarded as no more resistant than plain carbon steel in fresh or sea water.

The booklet cites test results indicating that certain alloying elements, particularly nickel, are relatively "more effective in enhancing corrosion resistance in marine atmosphere than in industrial atmospheres." While steels of the Cor-Ten type start to corrode at nearly the same speed as the others, the nature of the patina or initial layer of rust on Cor-Ten is said to provide a superior barrier against continuance of atmospheric corrosion. Charts compare the rates of corrosion of plain steel, copper-brazing steel and Cor-Ten. Corrosion resisting coatings, including paints, are also discussed.

Copies of this booklet may be obtained from offices of the following USS subsidiaries: AMERICAN BRIDGE CO., AMERICAN STEEL and WIRE CO., CARNEGIE-ILLINOIS STEEL CORP., COLUMBIA STEEL CO., NATIONAL TUBE CO., and TENNESSEE COAL, IRON and RAILROAD CO.

☆ ☆

Recommended R-W Practices

A 48-PAGE booklet published by the American Welding Society gives recommended practices for: (1) spot and seam welding of low-carbon, stainless and hardenable steels, nickel, Monel and Inconel; (2) projection welding of low-carbon and stainless steels; (3) flash-butt welding of low and medium forging-strength steels; and (4) standard methods for testing resistance welds. Each recommended practice includes a table of machine settings for current, voltage, time, pressure, etc. to produce welds of specified strength in various thicknesses of materials. The section testing methods covers tests for tensile properties, shear and impact strength, fatigue properties and hardness. Copies of this book may be obtained at 50c each from the AMERICAN WELDING SOCIETY, 33 W. 39th St., New York City 18.

☆ ☆

Welding and Cutting History

A 50-PAGE letterhead-size book, "Flames for Better Welding and Cutting," depicts the uses of flame-cutting from the goldsmith's blowpipe of the middle ages down to the huge machines of today for production shape cutting. This story of welding and flame-cutting was compiled by Ernest L. Mathy, first vice-president and advertising director of the Victor Equipment Co., and told in a free and easy-to-read informal style. Among the topics covered are weldable metals, flame-cutting by machine, gas welding, torch brazing, the importance of regulators, etc. There are also brief sections on manual-arc, atomic-hydrogen and helium-shielded arc welding, resistance welding and induction heating. VICTOR EQUIPMENT CO., 844-54 Folsom St., San Francisco 7.

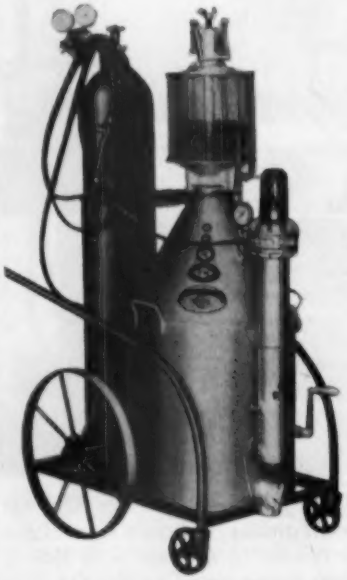
☆ ☆

Electrode Chart

AN interesting multicolor electrode chart recently released by the Hollup Corp. should prove of great value to the shop and plant weldor. This chart suggests electrodes for specific jobs and shows currents, positions, physical characteristics, etc. The electrodes included are recommended for mild, low-alloy and stainless steel, cast-iron, non-ferrous materials, hard-facing, etc. HOLLUP CORP., 4700 W. 19th St., Chicago 50.

HIGH COST ACETYLENE IS OUT!

With the trend today toward squeezing profits to a narrow margin it is more important than ever that you win the game against high production costs.



If you are a user of acetylene there is no easier way to cut down these high production costs than with a SIGHT FEED *Acetylene Generator*. You can save 50% to 75% on acetylene costs with a SIGHT FEED.

It doesn't matter if you are a small or large user of acetylene — there is a SIGHT FEED to fit your needs.

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FLUXES
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QUICKER,
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GOOD RESULTS

Successful welders have been using METAL BOND PRODUCTS for many years. They get uniform high quality and dependability at reasonable cost. Always abreast of newest developments—there is a METAL BOND PRODUCT for EVERY Welding or Brazing need. All METAL BOND PRODUCTS are sold on a MONEY BACK GUARANTEE.

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For Clamping Jobs that Can Be Done in No Other Way!

No. 610 Simplex Util-A-Tool. 10-tons capacity; 4¾" screw travel.

The Util-A-Tool clamps and securely holds parts for welding; including the clamping jobs that can be performed by no other method. Also pushes, pulls, spreads and lifts. A real manpower saver. Write for Bulletin P&P 45.

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Templeton, Kenly & Co.
Chicago (44), Illinois
Better, Safer Jacks Since 1899

Supply Timetable

A SUPPLY timetable indicating when the end of current material shortages may be expected has been published by the N. Y. Journal of Commerce to help industry's long and short term planning. All of the factors influencing the supply situation in 21 basic raw materials including steel, copper, lead, tin, etc. are brought up to date in this study. A copy of "Scarce Materials Timetable" may be purchased for 25c from the N. Y. JOURNAL of COMMERCE, 63 Park Row, New York City 15.

☆ ☆

Flash-Welder Pamphlet

THOMSON-Gibb "Flashes" (Vol. 12, No. 3) describes flash-welding installations pertaining to railroad car and automobile production. The front cover of this issue of the Thomson-Gibb house organ also features a fantasia in fabric fabrication by the noted modern artist, Boris Artzybasheff. THOMSON-GIBB ELECTRIC CO., Lynn, Mass.

☆ ☆

Training Film Catalog

WHAT is believed to be the largest collection of educational and teaching films available to schools and industry is contained in a newly published film catalog. The book provides a complete listing of all U. S. Government 16-mm sound films and 35-mm filmstrips, totaling 1,158. CASTLE FILMS, INC., distributors, 30 Rockerfeller Plaza, New York City 20.

☆ ☆

Cast Steel Shapes

A 16-page, letterhead-size booklet, describes the making of "cast-to-shape" steel tools and gives heat-treating, tempering, hardening, and annealing instructions for various types of tools. JESSOP STEEL CO., Washington, Pa.

☆ ☆

Shoe Booklet

A 5½ by 7½ in., 64-page booklet, "Let's Use Our Heads and Save Our Feet," contains a multitude of suggestions and information on foot protection and care. Types of foot hazards and the shoes that guard against them, "hero" shoes and toes they saved, problems of shoe fitting, etc., are among the topics covered. INTERNATIONAL SHOE CO., 1509 Washington Ave., St. Louis 3.

☆ ☆

Tip Cleaner Bulletin

A TWO-page, 8½ by 11 in. bulletin describes the use of "Wypo" tip cleaners for keeping torch tips clean. Sketches show the proper way to use the cleaner and compare flames from dirty and clean torch tips. THERMACOTE, Co., 420 So. San Pedro St., Los Angeles 13.

☆ ☆

Carbide Tool Catalog

A SIX-page, 8½ by 11 in. catalog describes the Metro line of carbide-tipped cutting tools and masonry drills. METRO TOOL and GAGE Co., 4240 Peterson Ave., Chicago 30.

Let Willson-Weld Glass Guard Your Welders' Eyes

Formula for welding eye safety: Willson One-Piece Welding Helmet *plus* green Willson-Weld glass *equals* dependable protection—from heat, glare, metal spatter, ultra-violet and infra-red rays.

Clear cover glass fits over Willson-Weld lens to protect it from pitting. Both lens and cover glass are easy, economical to replace. Helmet covers both front and sides of face and neck.

Look for the WW trademark on each Willson lens. Your assurance that it meets highest Federal specifications. Shade number indicates thickness and density of lens. Simplifies selection.

For help with your welding eye protection problems, consult your Willson distributor or write for further information.

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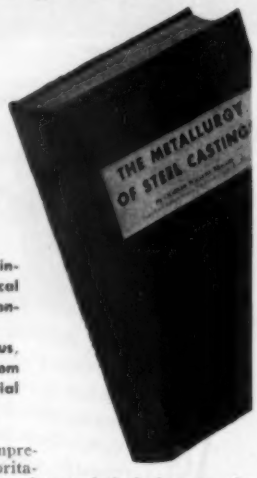
IMPORTANT FACTS ON

How to produce the BEST STEEL CASTINGS



- complete, detailed information on technical and metallurgical control
- standards, apparatus, and methods drawn from outstanding industrial research work

Here is a most comprehensive and authoritative work giving complete technical data on the chemistry, metallurgy, and technology of steel castings. Includes most up-to-date information on quality control of all manufacturing operations for production of railroad and turbine castings, bolsters, side frames, beds, truck and driving wheel centers, water power machinery, large ship castings, sternposts, rudder frames, struts, and hundreds of other applications.

Just Out **THE METALLURGY OF STEEL CASTINGS**

By CHARLES WILLERS BRIGGS, Technical and Research Director, Steel Founders' Society of America
625 *pages*, 334 *illustrations*. $6.50

Based on a survey of thousands of monographs and articles appearing during the past 15 years and on the author's own observations as research metallurgist since 1928, this single volume provides a complete summary of present-day methods of technical and industrial control in production of steel castings. Describes in detail every process used today—basic open-hearth, basic-electric, acid open-hearth, acid-converter, and acid-electric steel.

Among new techniques considered in detail are

- freezing by directional solidification
- acid open-hearth process for dead-killed steel
- control of porosity and cavity formation
- temperature control for solidification
- tapping and pouring methods
- gate system for molding
- effect of molten steel on sands
- welding methods as applied to castings
- and numerous other methods and applications

Over 300 illustrations are given, including many photomicrographs of various steels before, during, and after casting, together with many tables and charts of steel analysis.

10 DAYS' FREE EXAMINATION—*Mail Coupon*

McGRAW-HILL BOOK CO., 330 W. 42nd St., N. Y. 18
Send me Briggs' The Metallurgy of Steel Castings for 10 days' examination on approval. In 10 days I will send $6.50 plus few cents postage or return book postpaid. (Postage paid on cash orders.)

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Finishing Guide Book

THE new Brightboy catalog (No. 57) should interest plant engineers, work managers, supervisors, shop foreman and others who use rubber-cushioned abrasives in the finishing of metal, plastics or wood articles. The text and actual-use illustrations depict a wide variety of industrial applications of Brightboy abrasive products. Other information includes techniques, abrasive textures, machine speeds and specifications. BRIGHTBOY INDUSTRIAL DIVISION, WELDON ROBERTS RUBBER CO., Newark 7.

☆ ☆

Grinder Bulletin

AN eight-page, letterhead-size bulletin describing its new laboratories is released by BEHR-MANNING CORP., division of Norton Company, Troy, N. Y. This booklet announces a pioneering service in the coated abrasives industry; namely, the provision of branch-located methods and equipment rooms for industrial customers to use in pretesting their grinding, sanding and finishing tool-ups on standard commercial equipment.

☆ ☆

Electrode Folders

Two new "Ampco-Trode" folders have been released for the Spanish-speaking portion of the Latin-American market. Bulletin W8S, *Tabla de Aplicaciones Industriales* (Table of Industrial Applications), consists of ten pages of industrial applications for aluminum-bronze electrodes. The other, *Comprobado en el Servicio* (Tested in Service), is a six-page pocket-size folder. AMPCO METAL, INC., Milwaukee 4.

☆ ☆

Protective Oil Booklet

A 16-page, 3½ by 8½ in. booklet published by Oakite Products, Inc., describes the uses of a new rust-preventative oil having the unique properties of absorbing and displacing moisture. The booklet discusses the causes of rust, various applications of the oil, recommended dilutions and the many tests the manufacturer has given this product. OAKITE PRODUCTS, INC., 22 Thames St., New York City 6.

☆ ☆

Motor Generator Folder

THE MOTOR GENERATOR CORP., Troy, Ohio, a division of The Hobart Brothers Co., has just released a brochure covering a preview of the products that are being offered for postwar use. These products include various battery chargers and generator sets in capacities ranging from ½ thru 20 kw for magnet service or other high-voltage d-c requirements.

☆ ☆

Power Brush Booklet

A 24-page booklet designed to serve as an encyclopedia of power brush usage in manufacturing operations has just been issued by the technical department of THE OSBORN MANUFACTURING CO., 5401 Hamilton Ave., Cleveland 14.

☆ ☆

Carbon Brush Catalog

A 24-page, letterhead-size catalog gives complete facts and figures for the use of various brushes and electric contacts manufactured by the KEYSTONE CARBON CO., St. Mary's, Pa.

Dollars can't be made this way . . . but there's money in using

COLONIAL GLOVE AND GARMENT SPLITS

Welders demand their combination of greater comfort, safety, and durability. Available in all weights for men's and women's gloves and garments in large spread whole kips and side splits. Write for samples.

COLONIAL TANNING CO.
Glove and Garment Leather Division
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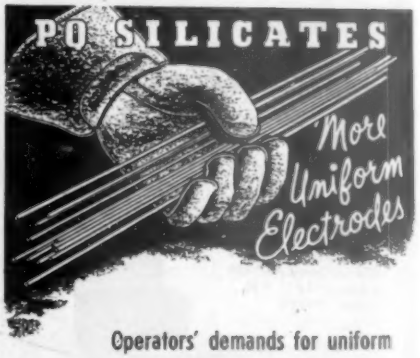

Operators' demands for uniform coatings on rods are satisfied when PQ Silicate is used as the binder. The fluxing action is right.

Have you a coating problem? Explore the advantages of PQ Silicates (potassium and sodium). Our Technical Dept. has wide experience in adapting silicates to various formulas and can be helpful.

PQ Silicates of Soda

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DEPT. A, 125 S. THIRD ST., PHILA. 6

Alloy Selector

THE "Inco Nickel Alloys Selector" is a new device for selecting the specific alloy for the proper job. A push of a slide, a turn of a dial and all the important facts about eight nickel alloys are mechanically digested, broken down and presented so that they can be read at a glance. The selector comes in a filing case that also contains a copy of "Properties of Some Metals and Alloys," a brief summary of the mechanical properties, physical contents and chemical compositions of more than 100 materials. The whole kit is easily kept in a desk file. INTERNATIONAL NICKEL CO., INC., 67 Wall St., New York City 5.

☆ ☆

Copper Alloy Handbook

"WELDING and Brazing of Copper and Copper Alloys" is the title of a new and helpful 32-page handbook of procedures and materials. The book opens with definitions of materials and processes and a table of compositions and properties of the most common commercial copper alloys. The introductory section also includes a chart which tells the preferred materials to be used with each method for welding or brazing the common copper alloys.

The second section of the booklet discusses each of the common alloys individually, giving composition, physical properties, forms usually supplied, suitability for hot and cold working, special welding characteristics, etc. This information is followed by an explanation of the applicability of each of the welding and brazing processes to the alloy. Tables of welding procedure are given for the processes recommended.

The third and final section is devoted to welding and brazing electrodes and uncoated rods of copper and copper alloys. For each electrode there is given such information as physical properties of weld metal, application procedures, recommended uses, sizes, etc. C. E. PHILLIPS & CO., 2750 Poplar St., Detroit 8.

☆ ☆

Induction-Heating Booklet

"INDUCTION Heat Works Metal Magic" is the title of a 12-page letterhead-size reprint from Allis-Chalmers' *Electrical Review*. The title article, by Dr. S. H. Mortensen, chief engineer, of the company's electrical department, describes the fundamentals of induction heating and compares vacuum tube converters, spark-gap converters, motor-generator sets, and mercury-arc converters on the bases of frequency range and approximate conversion efficiency. There are also articles by Dr. H. F. Storm, rectifier section (mercury-arc converter) and J. M. Cage, electronics section (vacuum tube converter). ALLIS-CHALMERS MFG. CO., Milwaukee 1.

☆ ☆

Precipitator Booklet

AN eight-page, letterhead size booklet describes the new Raytheon precipitator. Full details on the elimination of airborne dust and dirt are brought out in this interesting piece. RAYTHEON MFG. CO., INC., Foundry Ave., Waltham 54, Mass.

Arc Welder Folder

A FOUR-page, two-color, letterhead-size folder published by Mid-States Equipment Co., describes two new types of "Hy-Cycle" arc welders, which are furnished for use with the "Missing Link" high-frequency generators and the "9,000" carbon-arc torch. Model 200 has a capacity of 10-150 amp and Model 300 a capacity of 10-300 amp. These welders may be used on all metals, ferrous or nonferrous, for welding brazing, soldering and hard-facing and also for such heating operations as straightening and bending. MID-STATES EQUIPMENT CO., 2429 So. Michigan Ave., Chicago 16.

☆ ☆

Safety Products Catalog

THE new catalog of the American Industrial Safety Equipment Co. shows a wide range of goggles, spectacles, helmets, face shields, etc. One unusual feature of this catalog is a complete story of the manufacture of goggle lenses and welders' plates. Another feature is a lens chart which enables the user to select the proper type and shade for his particular purpose. AMERICAN INDUSTRIAL SAFETY EQUIPMENT CO., 392 Bridge St., Brooklyn 1.

☆ ☆

Abrasives Bulletin

BULLETIN No. 3 published by the Clover Mfg. Co., describes the various methods of testing coated abrasives and tells about the use of a special testing machine. CLOVER MFG. CO., Norwalk, Conn.

Are YOUR WELDING OPERATIONS LIKE A TRAFFIC LIGHT?

● You can eliminate costly "Stop-Go, Stop-Go" operations in your shop by installing the RegO Manifold designed for your requirements.

You not only gain the advantage of uninterrupted operations, but also save valuable production space and eliminate hazards.

Learn about *all* the advantages you can get with RegO Manifolds . . . there's no obligation . . . write today!

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Pioneers and Leaders in Equipment for Using and Controlling High Pressure Gases

NOW - Streamline Your Welding Procedure

VICTORY *Automatic* Seam Welder

Model 0412

A wartime development—*greatly improved* — combines HIGH welding output with low operating cost to produce a *better product!*

CONSIDER these outstanding advantages and you will see why MORE manufacturers using MANY types of seam-welded tubing are adopting the remarkable performance of the VICTORY Two-Man *Continuous* Tube Welder:

- Delivers up to 150" per minute of uniform, tight, straight welds
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- No splatter of metal—eliminates wasteful weld grinding and finishing
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- Efficiently employs Union Melt, Concealed or Submerged electric arc welding
- Designed for Rounds, Squares, and other shaped tubes

Learn more about the VICTORY Automatic Tube Seam Welder. Our engineers will give your inquiries prompt attention . . . show you how to get better welded tubing . . . faster, and at lower cost!

VICTORY ENGINEERING & MACHINE WORKS, Inc.

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"EITHEREND" CABLE CONNECTOR

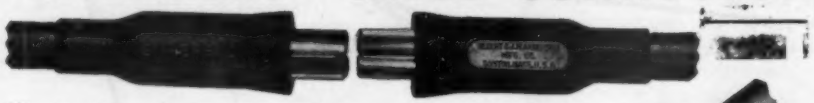

Illustration shows connector apart with sleeves

BOTH ENDS EXACTLY ALIKE
Neither male nor female

Center illustration shows connector protected by the insulating sleeves pushed together and locked, ready for work: butt rubber sleeves make waterproof joint.

Lower illustration shows solderless type of connector without rubber sleeves. Made in sizes from 4/0 to #10 soldered and from 4/0 to #6 solderless.

Send for Bulletin 49A

Albert & J. M. Anderson Mfg. Co.

289-305 A St. • Boston, Mass.
NEW YORK CHICAGO PHILADELPHIA LONDON

Hard-Facing Bulletin

A 16-page, 8½ by 11 in. technical bulletin on the uses of "Hardex" electrodes in building up surfaces for resistance to shock and abrasion covers such factors as the effect of temperature and cooling rates on the deposited metal, selection of the proper grade of electrode and recommended welding techniques. Many useful charts, curves and tables are given to supplement the text. METAL & THERMIT CORP., 120 Broadway, New York City 5.

☆ ☆

Caterpillar Booklet

A 32-page, 8½ by 11 in. booklet, "Men of Vision," has been published to tell the story of the evolution of Caterpillar products against the general theme of the never ending progress of research and engineering. The booklet reviews the steps of advancement from the horse-drawn combined harvester to the present Diesel-powered track-type tractors. CATERPILLAR TRACTOR CO., Peoria 8, Ill.

☆ ☆

Metal Fabricating Booklet

AN interesting 16-page, 8½ by 11 in. booklet describes the metal-fabrication services of HUNGERFORD CORP., Big Flats, New York. Photographic illustrations show the organization's comprehensive equipment for cutting, forming, arc welding, oxy-acetylene welding and spot welding. Stainless steel has been given particular attention by this fabricator.

☆ ☆

Electrode Bulletin

A TWO-page multicolor bulletin describes a "cool handle" electrode holder manufactured by the Detroit Electrode Holder Mfg. Co. A cutaway illustration makes clear the mechanism of the holder. The back page of the bulletin lists various features and advantages. DETROIT ELECTRODE HOLDER MFG. CO., Detroit 8.

☆ ☆

Lens Bulletin

A FOUR-page, 8½ by 11 in. bulletin from Eastern Equipment Co. shows the latest types of welding, grinding and chipping lenses, goggles, helmets, and hand shields, etc. EASTERN EQUIPMENT CO., Willow Grove, Pa.

☆ ☆

Precision Tool Catalog

A 36-page, letterhead-size catalog describing industrial tool equipment and supplies has been published by PRECISION EQUIPMENT CO., 32 No. State St., Chicago 2.

☆ ☆

Technical Book Catalog

A new catalog of technical books lists the latest books on chemistry, physics, engineering, metals, building construction, etc., published by the CHEMICAL PUBLISHING CO., INC., 26 Court St., Brooklyn 2.

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Bushings Bulletin

A FOUR-page bulletin (No. 80) just issued describes Ampco aluminum-bronze bushings and gives their sizes and prices. AMPCO METAL, INC., Milwaukee 4.

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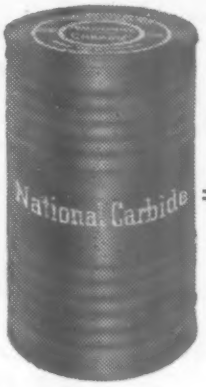

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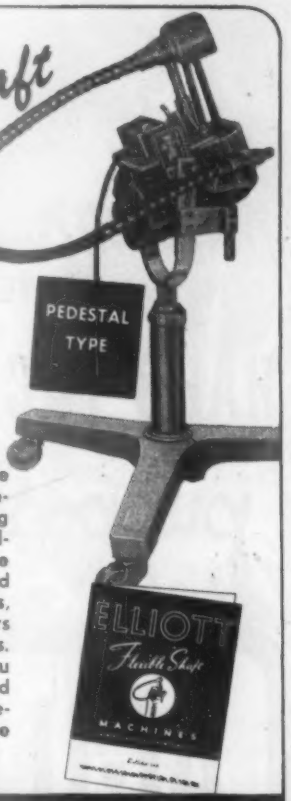

Wherever constant power in a portable tool is needed, Elliott Flexible Shaft equipment will do it better, faster and more economically. These rugged machines are particularly adaptable for removing flash after welding and for the grinding and polishing of welds. With the wide variety of accessories and interchangeable hand-pieces, it is possible to work in corners and irregularly shaped parts. Even with unskilled labor you can maintain efficiency and economy by eliminating time-consuming hand work. Write today for Bulletin 448.

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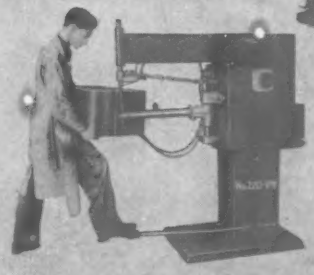

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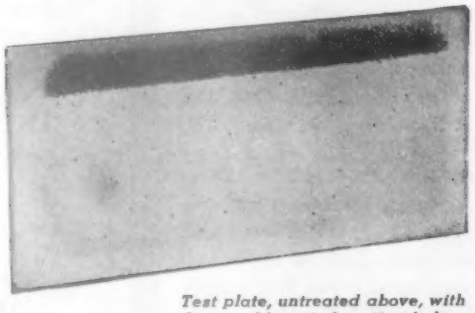

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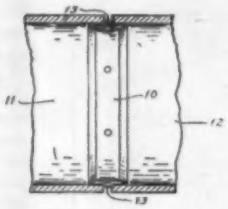
From the Patent Office

Weld Back-Up Ring

22,725. Robert H. von Ahrens, Denver, Colo. Filed (for reissue) Sept. 28, 1945. Issued Feb. 19, 1946.

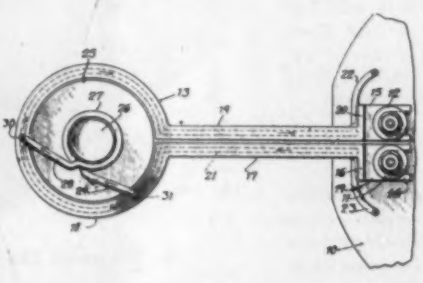


An annular metallic member having a cylindrical outer face. A number of round protuberances are punched out from the midsection of the member and are spaced circumferentially about its outer surface. The protuberances, formed by punching from the opposite side of the member, are adapted to gauge apart a pair of adjacent pipe ends to be welded. The cross-sectional shape is effective to preclude flow of metal through the recess formed by the punching operation, and the diameter of the recess formed by the punching out of the protuberances is sufficiently small so that surface tension alone prevents passage of molten metal therethrough when the protuberance is melted away by the heat of welding.

☆ ☆

Induction-Heating Apparatus

2,394,944. Robert J. Stanton, Brooklyn, N. Y., assigned to Induction Heating Corp., New York City. Filed Feb. 10, 1945. Issued Feb. 12, 1946.



An inductor for applying a high-frequency electromagnetic field to objects to be heated. It comprises a rigid conductor for encircling a portion of an object, a pair of closely spaced connection terminals secured to the ends of the conductor, and a second rigid conductor for applying a field to another portion of the object. The ends of the second conductor are fixed to the first conductor at predetermined points spaced so that the voltage drop across the second conductor will be less than that across the first-named conductor by a predetermined proportion.

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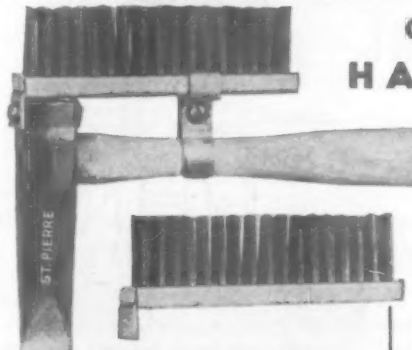

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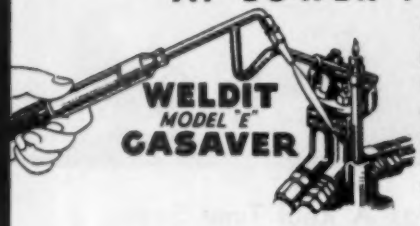

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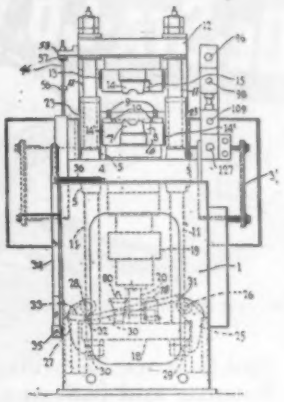
Vertical Flash Welder

2,396,002. George J. Frischmann, Queens Village, and Carl F. Brunner, Woodhaven, N. Y., assigned to Metropolitan Engineering Co., Brooklyn. Filed Jan. 22, 1942. Issued March 5, 1946.

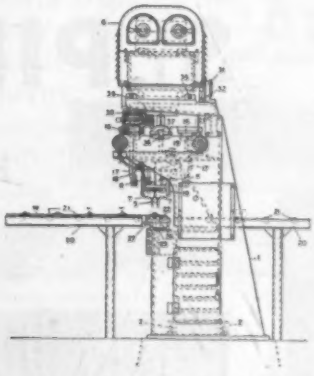


A flash welder comprising in combination a base arranged to support an electrode, posts extending from and slidably mounted in the base, a plate secured to the ends of the posts above the base and arranged to support a second electrode, another plate secured to the posts below the base, and a pressure-actuated means below the base. The latter is connected to the last-mentioned plate to effect movement toward and away from the base of the electrode carried by the first plate.

☆ ☆

Multiple Spot Welder

2,395,977. Charles W. Sidney, Summit, N. J., assigned one-half to The E. F. Hauserman Co., Cleveland. Filed Oct. 20, 1942. Issued March 5, 1946.



A spot welder having a plurality of spaced pairs of electrodes, a stationary contact for each electrode and leads between the contacts and electrodes to provide the same impedance in each electrode circuit. A movable transformer is fitted with rollers constituting the secondary terminals. The rollers travel on a trackway to the pairs of contacts connected with the corresponding pairs of electrodes. Other elements include a means for moving the transformer over the contacts of the electrodes and a means to maintain selected pairs of electrodes in contact with the work while current is thus being passed.

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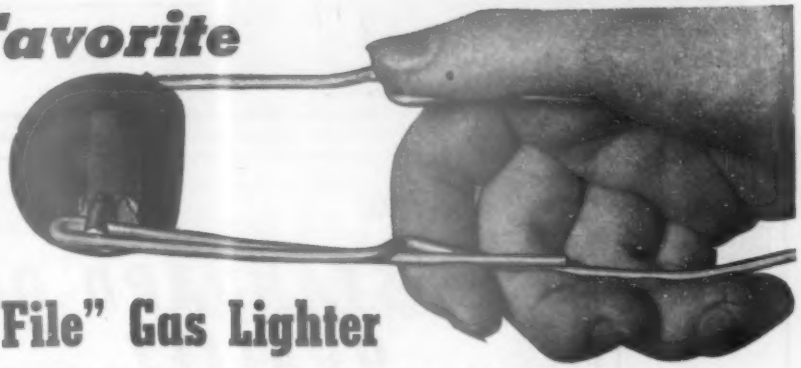

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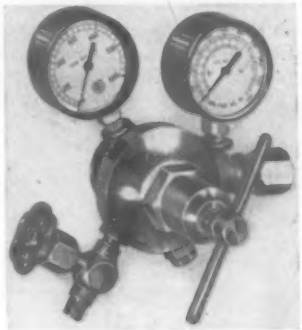

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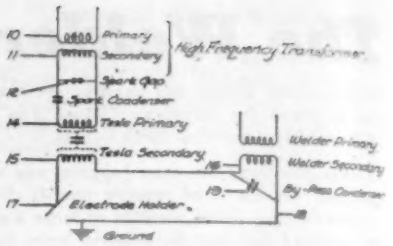

High-Frequency Arc Welder

2,395,062. Clayton P. Nielsen, Chicago, assigned to Mid-States Equipment Co., Chicago. Filed May 23, 1942. Issued Feb. 19, 1946.

This patent covers improvements wherein there is impressed on an ordinary arc-welding circuit a high frequency from a circuit whose components include a high-frequency transformer. A Tesla coil of special construction is connected to the secondary of the high-frequency transformer. The primary and secondary of the Tesla coils are bands of copper of approximately ¾ in. in width and are wound with the Tesla primary and secondary in opposite directions upon a dielectric of at least two inches in diameter. The Tesla primary has five turns and the Tesla secondary has six turns, so that the frequency is higher than the broadcast band normally used in radio. Other elements are a spark gap across the connections leading from the secondary of the high-frequency transformer, a spark condenser of approximately .003 microfarad capacity in one connection from the high-frequency secondary to the primary of the Tesla coil, and a bypass condenser of at least two microfarad capacity across the connections from the welding transformer secondary to the welding electrode and to the ground, respectively, and between the Tesla secondary and the welding secondary. The bypass condenser prevents high-frequency current from entering the welding transformer and increases the amount of high-frequency current available for the welding operation.

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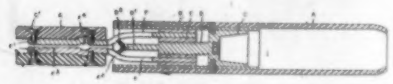

Electrode Holder

2,395,213. Philip L. Bourque, Detroit. Filed Jan. 24, 1944. Issued Feb. 19, 1946.

An electrode holder comprising a tubular handle formed of dielectric material, a metallic sleeve secured within the handle and a socket member secured within the sleeve for connection with the conductor cable. A male screw-threaded member projects forward from the socket and engages a female screw-threaded member which revolubly engages the sleeve. A pair of resilient arms is secured to the female member. These arms project outward from the handle and terminate in clamping jaws. The arms are biased towards clamping position and have obliquely inclined cam portions between the jaws and the female member. A member secured to and projecting from the male member engages the cams to spread the arms upon a relative rotation of the jaws and handle.

LATIN AMERICAN
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For several months we have been carrying on an extensive Spanish correspondence with reputable sources in Latin America in order to make available names and addresses of suitable welding distributors. As a result, we are developing a first-class list covering Mexico, Guatemala, El Salvador, Nicaragua, Costa Rica, Panama, Cuba, Dominican Republic, Colombia, Ecuador, Chile, Brazil and Venezuela. Names of distributors in Honduras, Peru, Argentina, Paraguay and Uruguay may soon be available also.

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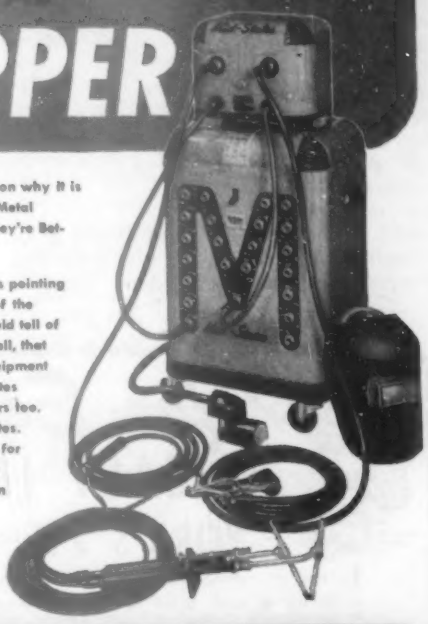

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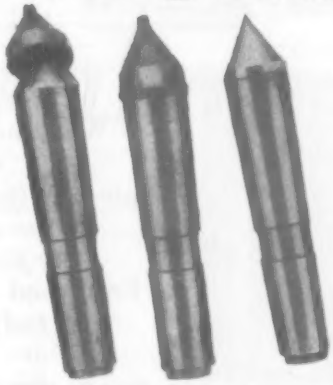

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CT-1 for full information

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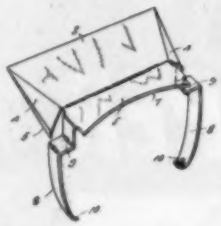
720 Fisher Bldg., Detroit 2, Mich.

Shield for Weldor's Helmets

2,394,388. Arthur Krogel, Spokane, Wash. Filed April 27, 1945. Issued Feb. 5, 1946.

A shield for a weldor's helmet comprising a visor extending the full width of the window and projecting forwardly a distance sufficient to prevent rain water from striking the glass of the window. The visor has side portions which are bent to extend downwardly at an outward incline and formed with depending flanges along their lower edges. The side portions and their flanges are tapered towards their front ends. A lip extending rearwardly from the visor fits in close engagement with the front portion of a helmet above the window. Resilient arms at opposite side edges of the lip extend downwardly in position for gripping the window of the helmet from opposite sides. Their upper end portions are bent to form shoulders for resting upon the top of the window and their lower ends are bent to provide portions for engaging under the window.



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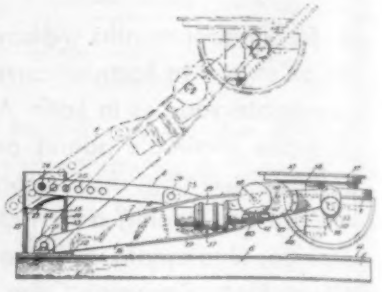
Welding Positioner

2,396,161. Edward V. Cullen, Chicago, assigned to Cullen-Friestedt Co., Chicago. Filed Aug. 21, 1943. Issued March 5, 1946.

A work positioner including a rigid, elongated boom-type frame having one end pivotally mounted to swing upwards and downwards about a substantially horizontal axis. At its distal end is a work-supporting and retaining table. The mount for supporting the table is capable of being rotated about its center and also tilted back and forth between a position wherein it overlies and an inverted position wherein it underlies the distal end of the frame. An upstanding mast is positioned adjacent the proximal end of the frame, and a rigid link-type element is positioned wholly on the upper side of the frame. One end of the latter is pivotally connected to the central portion of the frame, and its other end is adjustably connected to the upper end of the mast; this element serves to retain the frame in the various positions into which it is swung.



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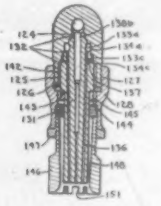
Underwater Cutting Torch

2,396,546. Frederick N. Windsor, Chicago, assigned to The Bastian-Blessing Co., Chicago. Filed Jan. 30, 1941. Issued March 12, 1946.



An underwater cutting torch head having a threaded portion and a gas-supply cavity whose wall defines a surface of revolution coaxial with the threaded portion. A tip mates with the cavity in gas-transmitting, sealed relation and has an outer end extending beyond the head. A portion of the tip's outer end is provided with an external wall defining a surface of revolution extending to the end of the tip. A hood received on the threaded portion encloses the outer end of the tip. The external wall on the tip and the internal wall on the hood define an annular passageway with walls converging gradually to a Venturi throat that is located at the end of the tip ahead of the diverging wall.

☆ ☆

Silver Solder

2,396,009. Franz R. Hensel, Indianapolis, assigned to P. R. Mallory & Co., Inc., Indianapolis. Filed Aug. 20, 1942. Issued March 5, 1946.

A silver solder composed of 25 to 60% silver, 10 to 35% copper and 20 to 50% antimony.

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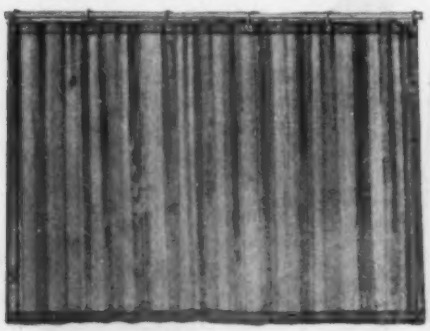

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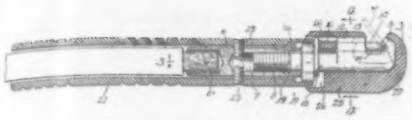
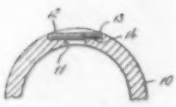


Electrode-Holder Member

2,395,343. Richard K. Morse, Muskegon, Mich., assigned to The Kaydon Engineering Corp., Muskegon. Filed Aug. 3, 1944. Issued Feb. 19, 1946.

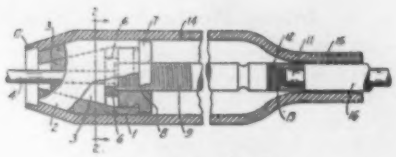
In an electrode holder, a member to which an electrical conductor is to be attached. It has a threaded bore to which is threaded a stem carrying a clamping hook. Member also has a coöperating sliding clamping pin eccentric to the stem. A follower on the clamping pin is slidable on the stem and presents a face for coöperation with the first-named member. When the stem is drawn into the member, the clamping hook will be threadedly drawn toward the clamping pin.



Brazed Joint

2,394,984. Gerard E. Claussen, Springdale, Conn., assigned to Machlett Laboratories, Inc., Springdale, Conn. Filed July 14, 1942. Issued Feb. 19, 1946.

This patent pertains to a joint which may be heated to a temperature of 800 C for short periods without injury and which, when part of a vacuum-tight enclosure, can withstand prolonged reheating at temperatures of the order of about 600 C without becoming leaky. The base is of the class consisting of nickel and nickle-copper alloys, and the element brazed to the base is formed predominantly of beryllium. A thin intervening layer of copper is fused to the base to secure it and the element together.



Electrode Holder

2,395,228. Herbert N. Lininger, San Francisco. Filed Aug. 8, 1944. Issued Feb. 19, 1946.

An electrode holder comprising a chuck provided with movable jaws to clutch a welding electrode. A jaw-actuating stem extends axially rearwardly from the chuck, and is secured to a conductor cable. The stem and chuck provide an electrically conductive connection between the cable and the electrode. An insulating sleeve is secured to the chuck and extends rearwardly over the stem and the adjacent end of the cable, in rotatable relation thereto.

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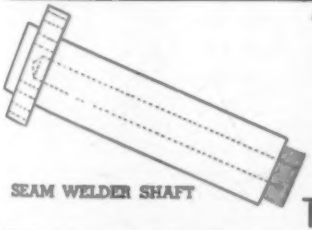

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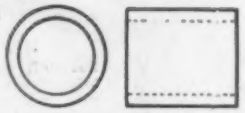

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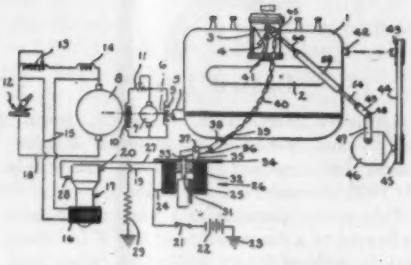
Idling Mechanism

2,396,176. Edward A. Hobart, Troy, O., assigned to The Hobart Bros. Co., Troy, O. Filed Nov. 20, 1943, and Sept. 7, 1944. Issued March 5, 1946.

A device applicable to a gasoline-engine-driven welder having a speed governor. It includes a combined extensible and compressible mechanical link between the governor and the throttle of the engine for maintaining the speed of the engine substantially constant, notwithstanding variations in the load on the generator. There is also a means for reducing the speed of the engine to an idling speed when no load is on the generator. The last-mentioned means and the speed governor operate independently of each other and exert a speed-control influence under no-load and full-load generator conditions, respectively.



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Tube-Welding Machine

2,395,059. Howard I. Morris, Lakewood, O., assigned one-third to Carl M. Yoder and one-third to Harvey O. Yoder, both of Lakewood, O. Filed Aug. 29, 1941. Issued Feb. 19, 1946.

The combination of a sectional frame rotatably mounted on a support, current-rectifying means, a transformer having the terminals of its secondary winding electrically connected to the rectifying means and conductor devices electrically connected to the rectifying means. The current-rectifying means is mounted between and rigidly secured to the frame section to which the transformer is fixed. The electrodes are fixedly related and electrically connected to the conductor devices.

☆ ☆

Face Shield

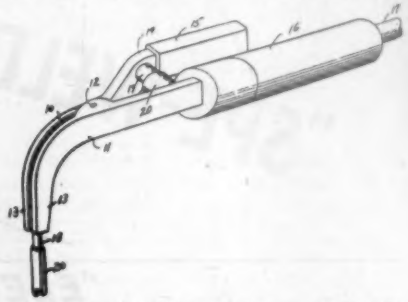
2,396,239. Edward R. Beck, Salt Lake City, Utah. Filed Dec. 9, 1943. Issued March 12, 1946.

A weldor's shield pivotally supported on the head of the user and able to be thrust to operative or inoperative positions by a shake of the head. A spring mechanism cushions the throw of the shield to operative position. The spring mechanism is compressed under the weight and thrusting movement of the shield to store up energy in excess of the force of gravity tending to move the shield member to operative position. Thus the shield member may be raised by a shake of the head to the inoperative position without impedance from its weight.

☆ ☆

Electrode Holder

2,394,877. Harold W. Schottenberg, Youngstown, and John J. Volsin, Poland, O. Filed July 26, 1943. Issued Feb. 12, 1946.



An electrode holder having a pair of gripping surfaces positioned side by side and hinged to each other. There is also a pair of handles having a spring positioned between them to urge the handles apart and the rod-holding portions together. The down-turned jaw structure terminates in tapering rod-holding members having means formed on their opposing surfaces for engaging the welding electrode.

Patents Available for Licensing or Sale

2,151,552. ELECTRODE HOLDER. Issued March 21, 1939. When not in use, jaws fold back along handle to break circuit, thus preventing damage or arcing should electrode contact metal surface. (Owner) Charles B. Jandos, Walsenburg, Colo.